



FRIDAY, MARCH 18, 1896.

CONTENTS

CONTRIBUTIONS:	PAGE.	EDITORIALS:	PAGE.
The Car Coupler Litigation.....	173	Annual Report of the Missouri Pacific.....	181
The Improvement of the Mississippi.....	173	A French Experiment with Reduced Fares... 182	
The Webb Compound—A Correction.....	173		
A Long-Span Arch Bridge 173			
Demurrage on Freight Cars in Georgia.....	173		
ILLUSTRATIONS:			
Wear of Tires on the Passenger Engines of New York Central & Hudson River Railroad for the past twenty years.....	174	Meetings and Announcements.....	183
60,000-lb. Coal Cars, Cleveland, Lorain & Wheeling Railroad.....	175	Personal.....	187
Tests of Cast-Steel Projects.....	178	Elections and Appointments.....	188
Simons' Drop Door for Gondola Cars.....	179	Railroad Construction.....	188
The Blockade on the New York Central.....	183	Electric Railroad Construction.....	189
Drop Smoke Stacks for Roundhouses.....	183	General Railroad News.....	189
EDITORIAL NOTES.....	189-82	Electric Railroad News.....	190
New Publications.....	182	Traffic.....	190
Trade Catalogues	183		
EDITORIALS:		MISCELLANEOUS:	
The Report on the Niagara Canal.....	180	Technical.....	184
		The Scrap Heap.....	185
		Rail Transit in New York.....	174
		Georgia Railroad Commissioners' Report.....	175
		Some Railroad Matters in England.....	177
		Prohibition of Useless Railroads.....	178
		Foreign Railroad Notes.....	179

Contributions.

The Car Coupler Litigation.

BUFFALO, N. Y., March 10, 1896.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of Feb. 28 you publish practically in full the opinion of Judge Coxe in the litigation instituted by the Gould Coupler Company against Pratt & Letchworth. In a technical news item in the same issue calling attention to the decision you state that as you go to press you learn that the appeal taken by Pratt & Letchworth has been withdrawn.

Judge Coxe's decision held that the Pooley coupler was not an infringement in any wise of the Barnes patent. He held, further, that the Pooley coupler, in its present form, was not an infringement of the Browning patent; and in his decree, as finally settled, at our request and to prevent any misapprehension as to the exact decision, the Judge himself formulated this concluding clause:

"It is not intended by this decree to enjoin the defendants from making, using or selling, nor shall they be held to account for, couplers made in substantial conformity to the blue print attached thereto—that is to say, couplers with the nose retained in substantial conformity with the red line on the blue print."

This decree was perfectly satisfactory to the defendants, because under it the non-infringement of the Pooley coupler was expressly decided and determined.

A general writ of injunction was taken out by the Gould Coupler Company. A motion was at once made to modify this injunction as not conforming to the decree. The motion was granted, the injunction dissolved, and permission given to take another containing the words of the decree. After this injunction was vacated the Gould Coupler Company took an appeal from the decree, and under the advice of our counsel and in ignorance of the exact nature of the error claimed by the Gould Coupler Company and to preserve all rights in the premises, we filed a petition for an appeal. After we had done this, the Gould Coupler Company reconsidered its action and withdrew its appeal. We then withdrew our appeal.

This is a brief statement of the situation. Our right to manufacture the Pooley coupler and the fact of its non-infringement of the Gould coupler have been expressly adjudicated. We are making them precisely in accordance with the blue print which we exhibited to the Court, and which the Court declared could not be regarded as an infringement, and we propose to push the sale in the market. We are ready to furnish a copy of this blue print to any consumer and to guarantee that every coupler conforms precisely to its lines.

We are prepared to protect every purchaser to the fullest extent. We ask you to give this notice the same prominence that you gave to the withdrawal of our appeal so that the trade may understand it.

PRATT & LETCHWORTH COMPANY,
O. P. LETCHWORTH, President.

The Improvement of the Mississippi.

ST. LOUIS, Mo., March 2, 1896.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Relying to Mr. Ockerson's communication of Feb. 17, which appeared in your issue of Feb. 28, I wish to say that in my communication published in your issue of Feb. 7, I did not mean to imply that Colonel Flad was the first person to suggest dredging sand bars in the Mississippi River. It is well known in this locality that rivermen have always been partial to this method of improvement. I did mean to say only that Colonel Flad was

the first to show how this work could be successfully carried out.

Mr. Ockerson's paragraph on this subject is, I think, entirely erroneous and misleading. He says "each member of this Dredging Committee prepared several alternative plans for a dredge, and their studies finally resulted in the experimental dredge Alpha. The actual work of plans, contract and construction was in the hands of the engineer officer in charge of the First District, who was not limited to 'Mere draftsmen with no engineering ability.' The district officer acted under the direction of the Committee on Dredges, and the result was a dredge, each end of which represented the idea of different members of the committee as to what the dredge should be. As it turned out, the pump of one end and the suction of the other failed to meet expectations, and the present dredge, Alpha, is the result of this compromise."

As I was supplied at the time with a full set of blueprints of the working drawings for this dredge, all of which are signed by Colonel Flad as being his individual design, and as I had numerous conversations with him on the subject and frequently visited the boat before it was put into service, I have every reason to believe that the dredge, as now operated, is exclusively, to all intents and purposes, the Colonel's individual design. I further venture to assert that if any other member of the committee ever prepared alternative plans for a dredge, they never were submitted either to the committee or to the Commission as a whole. If I am wrong in this statement Mr. Ockerson will be able to state the exact facts, since he is in a position to know. I further believe that the only portion of Colonel Flad's design which failed to meet expectations was an engine to operate a screw pump, furnished by the E. P. Corliss Manufacturing Co., of Milwaukee, during the absence on sick leave of their chief engineer, Mr. Edwin Reynolds, and that Colonel Flad objected to this engine at the time as being too unsubstantially constructed, but the contractor insisted that it would perform the work. As a matter of fact, it had to be taken out. The other end of the dredge, which, as Mr. Ockerson said, represented the idea of other members of the committee as to what the dredge should be, consisted of a suction drag carried under the stern of the boat, similar to that used in deepening the channels in New York harbor. This proved a total failure, but it was added at the request of several members of the Commission, and Colonel Flad was always particular to state that it was no part of his design and that he had no confidence in its operation on the Mississippi River. The only part which the "engineer officer in charge of the First District" had in connection with the design and construction of this boat, as I understood at the time, was to transact the business and to make the payments on the several contracts as they were completed. I am sure he had no part in the general design of the dredge as such.

The hearty support which the Commission is now giving to the dredging idea has been entirely developed since the very successful performance of the experimental dredge below Cairo, in the Fall of 1895. This performance was such as to convince any one of the entire practicability of the dredging idea.

Having shown that this plan is practicable and economical, the main question now before Congress is whether or not this work should be let by contract to the lowest bidder, or prosecuted directly by the United States authorities.

Messrs. Mason and Samuel are no longer asking for a franchise on their own account, but they and all the St. Louis River interests are asking that the work be let by contract to the lowest bidder who can furnish a sufficient guarantee, and who is to receive no compensation until the river has actually been kept open for an entire year. In all other departments of government work, where the methods have passed beyond the experimental stage, it is the policy of the government to let the work by contract, and there would seem to be no reason why that practice should not be followed in this case. It would relieve the Commission of a grave responsibility, and the work would be more cheaply accomplished in this way. Furthermore, if a private company should succeed in keeping the river open one year, it would be regarded as an absolute guarantee that the river was to remain navigable throughout the period covered by their contract, since the annual forfeiture of say \$1,000,000 for failure would be regarded as an assurance that the company would continue to perform the work, and if this contract were made for a period of say 20 years I believe all commercial interests depending on the river navigation would at once be based on the assumption that the river would remain a navigable channel at all seasons, for this period of time at least. On the other hand, if the government should succeed for one year in keeping the river open, no such assurance of a permanent channel would follow. Since a renewal of river transportation can only follow upon this absolute assurance of navigation facilities for a considerable period in the future, it would seem that the only practicable method of reviving these industries would be to enter upon a long-time contract of this sort with a private company.

J. B. JOHNSON.

The Webb Compound—A Correction.

Brooks Locomotive Works, |

DUNKIRK, N. Y., March 4, 1896.

TO THE EDITOR OF THE RAILROAD GAZETTE:

After we have issued our circular describing the fast run on the L. S. & M. S. Ry. Oct. 24 last, the question was

raised by a correspondent in New York as to the length of stroke in the Webb compound No. 1309 referred to in this circular.

This information regarding the English compound was taken from circular issued by Mr. Canniff, General Manager of the L. S. & M. S. Ry., and we did not investigate, ourselves, the dimensions for this compound locomotive further than to refer back to one of the copies of your paper, which we found gave the stroke of the Webb compound as 30 in., the same as given in Mr. Canniff's circular. Enclosed herewith find letter from Mr. Webb giving a few of the details and dimensions of his compound No. 1309. You will note that the stroke of this locomotive was 24 in. instead of 30 in., and as we are glad to be corrected ourselves in this matter we think the information will be of interest to you also.

BROOKS LOCOMOTIVE WORKS.

London & North Western Railway. |

CREWE, Feb. 18, 1896.

Dear Sir: In reply to your letter of the 12th inst., I have pleasure in giving you below a few particulars of my compound locomotive No. 1309, Adriatic:

H. P. cylinders.....	14 in. diam. by 24-in. stroke.
L. P. ".....	30 in. " 24-in. "
Driving wheels.....	7 ft. 1 in. diam.
Leading ".....	4 ft. 1/4 in. diam.
Boiler mean diameter.....	4 ft. 3 in. " 11 ft.
" length.....	225 each 1 1/4 in. diam.
No. of tubes.....	1,401 1/4 sq. ft.
Total heating surface.....	204
Firegrate area.....	175 lbs. per square inch.
Steam pressure.....	18 ft. 1 in.
Total wheel base.....	45 tons 10 cwt.
Weight on each pair of driving wheels.....	15 " 10 "
Height from rail level to center of boiler.....	7 ft. 10 1/4 in.
Total length of engine.....	30 ft. 1 in.
Total length of engine and tender.....	50 ft. 3 in.

F. W. WEBB.

A Long-Span Arch Bridge.

Wrought Iron Bridge Company, |
CANTON, O., March 3, 1896.

TO THE EDITOR OF THE RAILROAD GAZETTE:

We notice the article in yours of Feb. 28, referring to the new steel arch bridge at Niagara, and we wish to call to your attention at least one other arch bridge of larger span than that at Rochester. We send you, under another cover, a lithographic illustration of the same. The recent files of the *Engineering Record* give detailed illustrations of this work.

WROUGHT IRON BRIDGE CO.

[The bridge mentioned above is built of iron and has two main spans each 456 ft. c. to c. of end hinges with 90 ft. versed sine. The total length including approaches is 1,273 ft. and the weight 1,000 tons. It carries one roadway of 18 ft. and two footways of 6 ft. each. The width is 29 ft. c. to c. of arches. This was built in 1888 by the Wrought Iron Bridge Co. of Canton, O., from the designs of J. S. Sewall, engineer. This bridge is over the Mississippi River at Minneapolis, Minn. The same year the same company built a 3-hinged arch over the Salmon River at Pulaski, N. Y., with a span of 216 ft. c. to c. and 27 ft. versed sine. EDITOR RAILROAD GAZETTE.]

Demurrage on Freight Cars in Georgia.

Connecticut Car Service Association, |
HARTFORD, Conn., March 4, 1896.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have read with interest your editorial of Feb. 28 on the demurrage rules, issued by the railroad commissioners of Georgia, and particularly the criticism leveled at the Car Service Managers' Convention. You state that the managers discussed the subject of the rules as proposed by the Commissioners and seemed "to have based their conclusions on the ancient principle that it is nobody's business how they administer their demurrage rules; that the railroad commissioners have no right to interfere." This criticism is hardly fair, and I beg a little space in order to give you and the readers of the *Railroad Gazette* a different impression of the discussion referred to.

At that time (Feb. 14) the Commission had given notice of a hearing on the question of discrimination on the part of the Georgia railroads in enforcing car service rules at Macon and other points in the state while not enforcing them at Atlanta. So far as the right of the Commission to enforce rules, governing charges for the detention of cars is concerned, I think a majority, if not all, of the car-service managers in the country would be only too pleased to have the Commissioners, in their respective states, authorized to lay down the rules, as has been done in Missouri and Texas. The point discussed was whether the business interests of Macon were injured by the non-enforcement of the rules at Atlanta and whether Macon was, therefore, discriminated against. If we can judge by the results in northern cities, the merchants of Macon, under car service rules, had practically a monopoly of the business of their own city, and a good opportunity to get a share of Atlanta's trade by being able to detain cars in the latter city indefinitely, and so compete with the merchants of Atlanta without the expense of storage. On the other hand, the car service rules would have a tendency to restrict Atlanta's trade in Macon, so that Atlanta would be the loser and not Macon.

The general effect of car service rules has proved beneficial rather than detrimental to the business interests of communities where they are enforced, and the car

service managers would gladly see a uniform enforcement of the rules at all points in the United States, whether local or competitive.

E. A. GORDON.

Rapid Transit in New York.

If the consent of property owners along the proposed line of the new rapid transit railroad in the city of New York cannot be got the next step is for the Supreme Court to declare the work of public utility, after which the necessary rights can be secured under condemnation. This second step has become necessary, and last December a Board of Commissioners appointed by the Appellate Division of the Supreme Court was organized, and immediately began taking testimony on the subject. These Commissioners are Frederic R. Coudert, George Sherman and William H. Gelshenen. The Commissioners made an exhaustive, not to say exhausting, inquiry, and have now submitted their report (under date of March 6) to the Supreme Court.

The commissioners do not consider that they were called on to select a route or a plan different from those of the Board of Rapid Transit Commissioners. The question is not whether there may be some other and preferable method of rapid transit, but whether the plan of the Rapid Transit Commissioners, and that plan only, should be considered. If the construction and operation of the road, as devised by the Rapid Transit Commission, promise to be of public benefit and to promote the general interests of the community, the Supreme Court Commissioners conceive it to be their duty to sanction the route proposed and to declare that the road ought to be constructed and operated.

This Commission considers briefly the need of additional facilities, and of this there can be no doubt. The means of transportation in the metropolis are "absolutely inadequate to the legitimate demands of the public." The phrase "legitimate demands of the public" does not strike us as being very fortunate; it is at least obscure. One must interpret for himself what is meant by demands and what is meant by legitimate. It is safe to start with the proposition that the people of the city of New York have no right to any transportation which they are not willing to pay for in some way. It may be best to rely entirely upon private companies who are paid for the service they render by the fares that they collect. It may be best for the city to build and work its own railroads, and even to carry passengers free. It may be best to make some compromise between these two extreme methods. All of this is a question of policy. There is a very loud demand for more facilities which comes from real estate owners up town, but we have seen no indication that those real estate owners have any notion whatever of putting their hands in their own pockets to build a railroad which would add greatly to the value of their property. There is a demand also from business men in the lower end of the island, but a very large part of those business men seem to think that the railroad ought to run a block away from their own store or office fronts. The demands of these people seem to be that some unknown and unnamed persons shall bear the cost and take the risk of building and working the road, and that they (the demanders) shall enjoy the result. Whether or not demands of this class are considered by the Supreme Court Commissioners legitimate we are left to conjecture. It is safe, however, to say that the comfort and convenience and prosperity of the city of New York would be served by additional means of getting about cheaply and quickly over long and short distances. We assume that this is about what the Commission means by the legitimate demands of the public.

The Commission is inclined to concur with the Rapid Transit Board in the conclusion that "the only adequate method to satisfy the just expectations of our people was by the underground road." It is recognized, however, that there are objections to such a scheme. Travelers have a prejudice against going down a long flight of stairs and hiding themselves from the sunshine and open air, "but these inconveniences must be put up with if real rapid transit is to be furnished."

The main attack on the proposed plan is that Broadway should not be selected for the experiment. The Commissioners have considered the objections to the use of Broadway, but are convinced that the temporary inconveniences are unavoidable. They are great, but not out of proportion to the magnitude of the plan. The arguments in favor of selecting the greatest thoroughfare of the city exceed the drawbacks. A rapid transit scheme must present attractions to a contractor or he will not touch it. The locality through which the greatest number of persons daily pass will offer the most alluring field, while offering accommodations to the largest number of citizens.

The commissioners refuse to attempt to decide whether or not the proposed road can be built for \$50,000,000. Engineering experts having special qualifications to decide fail to agree. That being so it is not supposable that the commissioners can decide. If the question were whether or not the city of New York should undertake the building of the road it might be the duty of the commissioners to try to decide this point. But the road is to be built and worked by individuals who can study the subject from a practical standpoint and who will not put their money into an enterprise that fails to show a reasonable prospect of profit. It seems to be the duty of this Commission to decide, assuming that the road can be built, whether or not it ought to be built in case anyone is willing to build it and is ready to assume conditions that will make the experiment safe for the city.

Under this assumption the Commission is not compelled to indulge in conjecture as to probable cost.

It is considered beyond question possible to build the proposed road. The only safe and practical conclusion then is that the Board of Rapid Transit Commissioners should be permitted to test the possibility of carrying out their plan. This test will come when the work is offered for bids. Then it will be demonstrated whether or not a responsible contractor, working under reasonable safeguards for the city, can be found to undertake the work. It is the opinion, therefore, that the Rapid Transit Board should be allowed to prove the accuracy and practicability of its scheme.

The Broadway property owners complain that their buildings are liable to injury during construction; that traffic will be diverted from the street during construction, and that their vaults will be taken away without compensation. As to the first objection it is answered that the owners of the property have the law on their side. Their interest will be guarded and their losses will be made good. As to the diversion of traffic, it is replied that this difficulty is probably overrated, and that there is reason to hope that the increased value of property on Broadway after the road is built will more than make good the temporary annoyance. As to the vault question, it is doubtful whether the property owners are entitled by law to any relief. They have built vaults and occupied them under license from the city. Whether that license is revocable is not within the province of the Commission to decide, but the consensus of counsel seems to be that it is revocable. In any case this seems to be an instance in which the hardship to the individual should not interfere with the interests of two million people. This phase of the subject has been very carefully considered by the Commission, and it is not without reluctance that it concludes that the public needs must override the equitable considerations.

The question of income from the road is even more speculative than the question of cost. Experience so far has been that the facilities for transit never increased so

the higher standard of track maintained, the rate of the wear of tires for the heavier locomotives has not increased, but, on the contrary, decreased. In 1883, on the 65-lb. rails, with deep, narrow type of head, drivers carrying 13,360 lbs. ran an average of 19,400 miles for a loss of $\frac{1}{16}$ of an inch in thickness of the tires. This was the second type of 65-lb. rails, the first one having been rolled in England and had a wider head.

In 1884 the 5-in. pioneer 80-lb. rail was put in service, the head being $2\frac{1}{2}$ in. wide. Its use was yearly extended and by 1889 locomotives on the Hudson Division made nearly one-half of their mileage on the 80-lb. rails. Engines then carrying 17,600 lbs. per driver ran an average of 19,300 miles per loss of $\frac{1}{16}$ of an inch in thickness of tire.

In 1891 passenger engines on the Hudson Division made their entire mileage on the 80-lb. rails, while those on the Mohawk and Western Divisions made about three-quarters of theirs on the same class of rails; drivers carrying 20,000 lbs. ran an average of 19,400 miles per loss of $\frac{1}{16}$ in. in thickness of the tire. This refers to the loss by wear and re-turning for future service.

In 1892 the 100-lb. rail, head 3 in. wide, was laid on the Harlem Line which carries the combined passenger traffic of the three railroads entering and leaving Grand Central Station, New York City. The renewing of the entire line of the New York Central & Hudson River Railroad from Mott Haven Junction to Buffalo and return with 80-lb. rails was completed in 1892. In 1894 the 100-lb. rail was laid from Spuyten Duyvil to Peekskill, making about one-quarter of the Hudson Division laid with 100-lb. rails.

In June, 1895, I asked Mr. Wm. Buchanan, General Superintendent of Motive Power and Rolling Stock for the mileage of some of the class "I" engines running over the 80 and 100-lb. rails, and below will be found the entire list except No. 903. When the class "I" engine was designed in 1889, the weight on each driver was 20,000 lbs., but as the 80-lb. rails were put into the track the weights have been increased to 22,000 lbs. The total weight of the locomotives and

TABLE NO. 2—SHOWING THE WEAR OF TIRES OF ENGINES WITH 20,000 TO 22,000 POUNDS ON DRIVERS, RUNNING ON 80 AND 100-LB. RAILS—OPEN-HEARTH STEEL TIRES.

No. of engine.	No. of miles run.	Driver.	Circumference in feet.	Area of metal worn off per sec. sq. inch.	Pounds metal lost per tire.	Pounds of metal lost per 1,000 miles run.	Pounds of metal lost 4 drivers per 1,000 miles run.	Remarks.
870	167,176	L ft front. Left rear. Right front. Right rear.	20.41 20.41 20.41 20.41	0.630 0.480 0.445 0.380	43.61 33.32 31.88 26.28	0.261 0.199 0.184 0.157	0.801	Running on 80 and 100-lb. rails
"								Running on 80-lb. rails. Plaster cast of only one tire obtained.
903	152,314		22.00	0.680	50.83	0.333	1.332	
ENGINES RUNNING ON FIRST PATTERN ENGLISH 65-LB. RAILS 1876, CRUCIBLE STEEL TIRES, 15,000 TO 18,000 LBS. ON DRIVERS, N. Y. C. & H. R. R. R.								
81	53,219	Left front. Left rear. Right front. Right rear.	18.06 18.06 18.06 18.06	0.242 0.280 0.270 0.355	13.81 16.86 16.58 21.80	0.247 0.301 0.296 0.390	1.234	Running on English 65-lb. rails head $2\frac{1}{2}$ inches wide.
"								Running on English 65-lb. rails head $2\frac{1}{2}$ inches wide.
86	73,647	Left front. Left rear. Right front. Right rear.	18.06 18.06 18.06 18.06	0.400 0.403 0.400 0.460	24.56 24.74 24.56 28.24	0.334 0.336 0.334 0.383	1.387	
New York and Harlem R. R. 1876.								
4	98,864	Left front. Left rear. Right front. Right rear.	17.28 17.28 17.28 17.28	0.440 0.650 0.580 0.660	25.85 38.19 34.07 38.40	0.231 0.388 0.344 0.388	1.379	Running on English 65-lb. rails head $2\frac{1}{4}$ inches wide.

LOSS PER YARD IN CIRCUMFERENCE OF TIRE, PER 1,000,000 TONS ROLLING CONTACT ON THE RAILS.

No. 870.....	0.042 lbs.
" 903.....	0.070 "
" 81.....	0.121 "
" 86.....	0.136 "
" 4.....	0.132 "

tenders in running service is 200,000 lbs. or over, 40,000 lbs. being upon the truck. The mileage of the tires only includes one turning since October, 1892, and ends March, 1895. Some of the engines did not enter service until 1893 and others 1894. The numbers of the 43 locomotives are as follows: 870, 872, 873, 874, 875, 876, 877, 878, 880, 881, 882, 884, 885, 887, 889, 890, 891, 893, 894, 895, 896, 897, 898, 899, 900, 902, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 917, 918, 919, 920, 921, 922.

The list is so large, covering such a wide range of service, that it must show conclusively whether or not a broad, flat-topped rail increases or decreases the rate of wear of tires running over them.

The 43 engines ran 3,706,567 miles, and the total loss in thickness of tires in sixteenths of an inch was 160, or an average of 23,166 miles for a loss of each $\frac{1}{16}$ of an inch of tire.

Twenty-three of the engines which ran in part over the 100-lb. rails show an average mileage of 29,046 miles for each $\frac{1}{16}$ of an inch loss in thickness of the tire.

The mileage of 19,400 miles per loss of $\frac{1}{16}$ of an inch in thickness shown by the light engines on the 65-lb. rails is now much exceeded by the heavier engines on the 80-lb. rails—the average mileage being 23,166 miles, and on the 100-lb. rails it will exceed the 29,046 miles which over one-half the present engines now show by only making a part of their mileage on the wide rails.

The comparison between the wear of tires on the engines running the "Empire State Express" over the Hudson Division making one-fourth of the mileage on the 100-lb. rails and the one running over the Western Division exclusively on 80-lb. rails is very interesting. The cuts show the approximate wear as obtained by plaster casts after the mileage indicated on them had been made by the engines.

Wear of Tires on the Passenger Engines of the New York Central & Hudson River Railroad for the Past Twenty Years.

Comparing the weights upon the drivers a few years ago with those in present use shows an increase in the static or dead load of some 65 per cent., while the increased speed of the trains now produces dynamic effects more than double the static loads, yet by increasing the width of the head of the rails as they were renewed and

Engine 870 commenced the service for which the wear of the tires is shown May 25, 1894, and completed it Dec. 21, 1895.

The engines are double-crewed, as is customary with all, and the mileage made per month, days worked and idle are shown in the following table:

TABLE NO. 1.—ENGINE NO. 870.

Month.	Miles Run.	Number of days.		Remarks.
		Worked.	Idle.	
May 25, 1894...	1,332	5	1	Cooled down and boiler washed.
June.....	8,880	30		
July.....	9,175	31		
August.....	9,175	31		
September.....	8,880	30		
October.....	9,175	31		
November.....	8,880	30		
December.....	8,596	30	1	Cooled down and boiler washed.
January, 1895.	8,584	31		
February.....	7,902	28		
March.....	9,188	31		
April.....	8,576	29	1	Cooled down and boiler washed.
May.....	9,200	31		
June.....	8,906	30	1	Cooled down and boiler washed.
July.....	8,880	30	1	Cooled down and boiler washed.
August.....	8,980	31		
September.....	8,880	30		
October.....	9,188	31		
November.....	8,879	30		
Dec. 21, 1895...	5,835	21		
	167,176	571	4	

NOTE.—The fire was not drawn except on dates mentioned in remarks.

On Sundays No. 870 ran the Fast Mail. Engine No. 870 entered service April 23, 1890, and including December, 1895, made a total mileage of 525,467 miles, or an average for the entire time of 7,727 miles per month.

GENERAL DIMENSIONS OF THE CLASS "I" ENGINES OF THE N. Y. C. & H. R. R. R.

Cylinder, diameter and stroke.....	19 in. \times 24 in.
Steam port.....	18 " \times 1 $\frac{1}{4}$ "
Exhaust port.....	18 " \times 2 $\frac{3}{4}$ "
Bridges.....	1 $\frac{1}{4}$ in. wide
Valves.....	Richardson patent balance
" travel.....	5 $\frac{1}{2}$ in.
" outside lap.....	None
" inside.....	None
Exhaust nozzle, double, diameter.....	3 $\frac{1}{2}$ in.
Smoke stack, straight inside.....	16 "
Boiler diameter, smallest ring.....	58 "
" material.....	36 in. steel
" pressure per square inch.....	170 lbs.
Firebox, length outside.....	105 $\frac{1}{2}$ in.
" width.....	40 $\frac{1}{2}$ "
" area, square feet.....	27.3
Flues, number.....	268
" outside diameter.....	2 in.
" length between sheets.....	11 ft. 11 in.
" heating surface, square feet.....	1,670.7
Firebox, heating surface, square feet.....	150.8
Total.....	1,821.5
Weight, engine working order.....	120,000 lbs.
" on drivers.....	80,000 "
" on trucks.....	40,000 "
" maximum tender loaded.....	80,000 "
Kind of Brake.....	Westinghouse Air Brake Co.
Driving journals.....	8 $\frac{1}{2}$ in. \times 10 $\frac{1}{2}$ in.
Engine truck journals.....	6 " \times 10 "
Tender " "	4 $\frac{1}{2}$ " \times 8 "
Crank pin " main.....	5 $\frac{1}{2}$ " \times 5 $\frac{1}{2}$ "
" side.....	4 $\frac{1}{2}$ " \times 3 $\frac{1}{2}$ "
Ratio heating to grate surface.....	0.015
Square feet of heating surface to one cubic foot of cylinder volume.....	232
Tractive force per pony M. E. P.	111.07
Adhesion to tractive force.....	0.20
Total length of locomotive over all.....	57 ft. 1 $\frac{1}{4}$ in.
Engine truck wheel base.....	6 " \times 1 "
Center of rear tender wheel to center of driver.....	8 " 9 "
Wheel base of drivers.....	8 " 6 "
Center of rear driver to front truck wheel.....	7 " 7 "
Wheel base of tender trucks.....	4 " 5 "
Space between " ".....	6 " 4 $\frac{1}{2}$ "
Diameter of drivers.....	75 "
" engine and tender wheels.....	36 "
Tank, water capacity.....	3,587 gals.
" coal.....	624 tons

Engine No. 903 ran the "Empire State Express" on the Western Division from April 3, 1894, to Dec. 3, 1895, total mileage 152,314.

Of the four tires of engine No. 870 the left front one was physically the softest and shows the most wear. Both front drivers show increased wear over the rear ones from crushing the sand when first applied to the rails, and is more noticeable than on the crucible steel tires of the lighter engines of which I took plaster casts many years since.

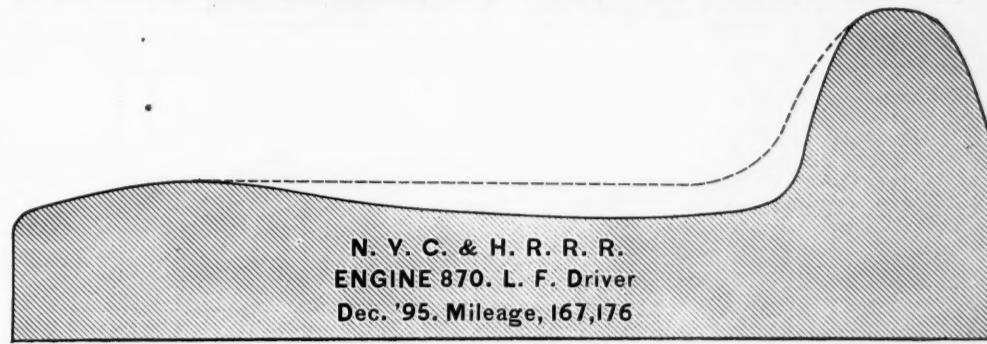
Ross-Meehan shoes were applied to the drivers covering the full tread and flange of all drivers for both engines. On No. 870 considerable wear was produced on the outside of the flanges of the left side drivers, which is not included as it was not produced by the rails.

The wear of tires per 1,000,000 tons rolling contact on the rails for the amount of metal lost as shown by plaster casts would be influenced by many conditions which need not be considered at this time, yet the results point to the same general fact that by widening the top of the rail and giving it a larger top radius the rate is decreased, notwithstanding an increased weight is carried upon the drivers.

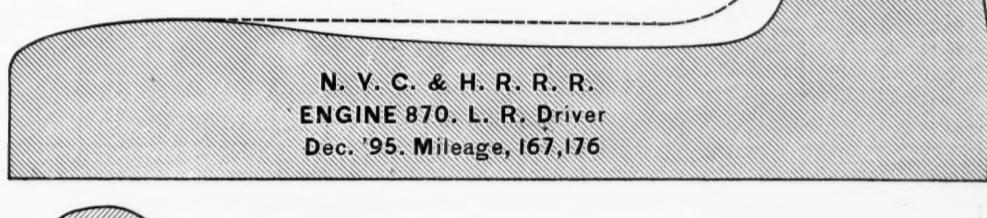
The top radius of the pioneer 80-lb. rail is 12 in., with $\frac{1}{8}$ in. corner radii, and for the 80 and 100-lb. rails laid in 1892 and since, it is 14 in., and corner radii of $\frac{1}{8}$ of an inch. The important point is to secure as large an area of contact between the drivers and the rails as practicable, for the larger the area is, the less are the wheel pressures per square inch of contact and the greater width of metal of both rails and wheels to resist and distribute the tractive force exerted, lessening the pull on the flattened scales of the mineral aggregates of the tires and rails. Freight engines exerting a great tractive force wear their tires much faster than passenger engines of same weight and even greater speed. The tractive force of both 870 and 903 on the rails drawing the same train would be practically alike, and the difference in wear of tires mainly due to the greater average area of contact of

870, running part of its distance on the 100-lb. rails, while 903 ran entirely on 80-lb. rails. The mileage of either engine is very large, nearly double what is obtained on the narrow headed rails, as will be seen by a comparison with engines Nos. 84, 86 and 4 in the list of those which ran on the 65-lb. rails. The practical results of introducing the broad-topped stiff rails show a decreased wear of tires, frogs, rails and ties and less expense of maintenance, while the speed and train loads have been largely increased. The standard freight train

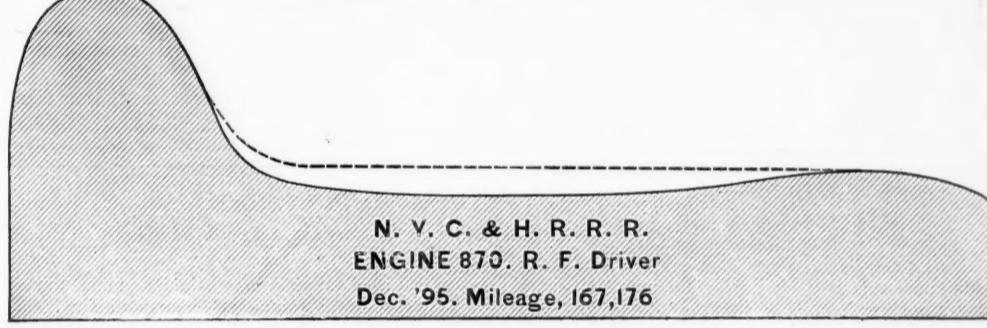
pioneer 5-in. 80-lb. rail met with decided opposition as being heavier and stiffer than was needed. Its introduction was largely due to the persistent efforts of Mr. J. M. Toucey, then General Superintendent, but now General Manager of the New York Central & Hudson River Railroad. The rail once in the track made friends and had strong advocates for the value of stiffness in a section was recognized, the principle being utilized by many railroads. It is not weight alone but stiffness as well which gives value to a section. It marked an epoch in



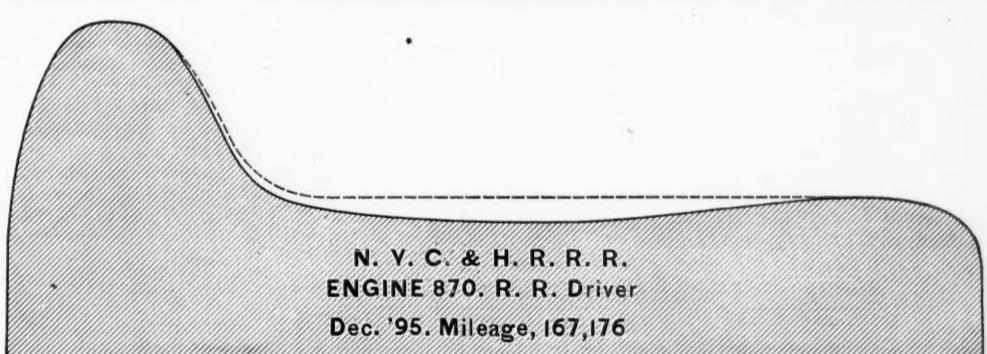
N. Y. C. & H. R. R. R.
ENGINE 870. L. F. Driver
Dec. '95. Mileage, 167,176



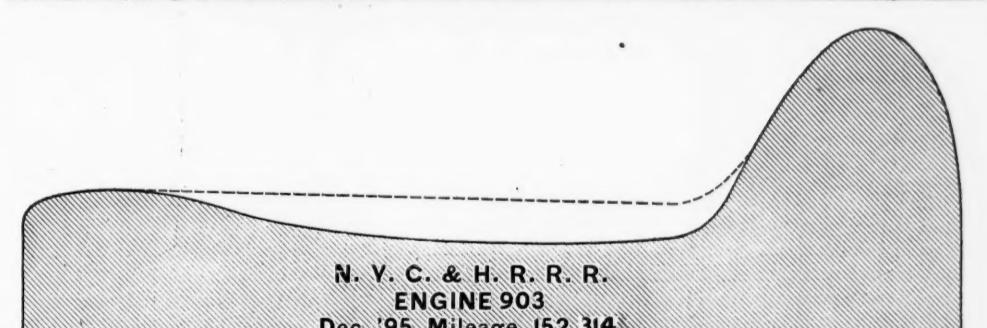
N. Y. C. & H. R. R. R.
ENGINE 870. L. R. Driver
Dec. '95. Mileage, 167,176



N. Y. C. & H. R. R. R.
ENGINE 870. R. F. Driver
Dec. '95. Mileage, 167,176



N. Y. C. & H. R. R. R.
ENGINE 870. R. R. Driver
Dec. '95. Mileage, 167,176



N. Y. C. & H. R. R. R.
ENGINE 903
Dec. '95. Mileage, 152,314

Wear of Locomotive Tires on the New York Central & Hudson River Railroad.

load of the N. Y. C. & H. R. R. on the 80-lb. rails is 50 loaded 60,000-lb. capacity cars, making a gross load of 2,250 tons, forming a train 2,000 ft. long, which runs 150 miles in six to eight hours. The train load has more than doubled from the old 65-lb. rails.

The broad thin type of head is making rapid progress abroad. Mr. Haarman, at the Osnabrück Works, Germany, has introduced several sections, while many are being rolled in England for India and Australia. My 80-lb. section has recently been rolled in England for two Canadian lines.

While the thin wide head and stiff type of rails is now generally recognized as the most economical form, the

railroad progress, and while the advantages of a broad head and stiff 5 in. rail have exceeded expectations, there are still greater values to be obtained by the use of the broader head and stiffer 100-lb. rail.

P. H. DUDLEY.

NEW YORK, March 2, 1896.

Georgia Railroad Commissioners' Report.

The Railroad Commissioners of Georgia, L. N. Trammell, Allen Fort and G. G. Jordan, have issued the 23rd report of the Commission. It is for the year ending Oct. 15, 1895. The book contains a copy of the act creating the Commission, which was passed in 1879, from which it

would appear that the reports have been made oftener than once a year.

The length of railroad in Georgia is 5,241 miles, an increase of 138 miles over the length shown in the 22d report. The actual amount of new mileage that has been reported to the Commission is considerably more than this, but numerous corrections in measurement have been made. The report states that the general condition of railroads in Georgia has improved. When the last preceding report was filed there were in the hands of receivers in Georgia 1,961 miles, while the amount thus

body. Peach growing has also become an important industry, and the railroads voluntarily granted low rates to the North and East. The number of cars of peaches sent out of Georgia during 1895 was estimated at nearly 1,000.

The Travelers' Protective Association complained that the Southern Railway ran a train which had no ordinary passenger cars, thus compelling every passenger to pay extra fare, and the road, on application of the Commission, put day coaches on the train.

Complaints of overcharges on lumber have been num-

60,000-Lb. Coal Car, Cleveland, Lorain & Wheeling Railroad.

The Cleveland, Lorain & Wheeling has recently had built 950 60,000-lb. coal cars which have several good features in their construction tending to make them strong, serviceable cars. Of these, the Michigan Peninsular Car Co., built 650; the Wells & French Car Co., 150, and the Mount Vernon Car Co., 150. Through the courtesy of Mr. F. H. Stark, Master Car Builder of that road, we are enabled to give drawings of

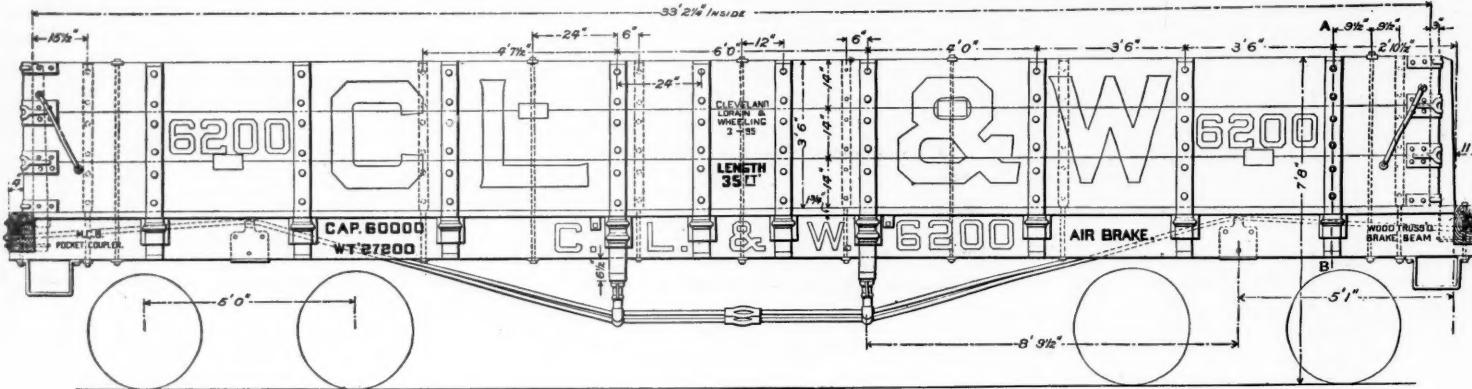


Fig. 1—Side View.

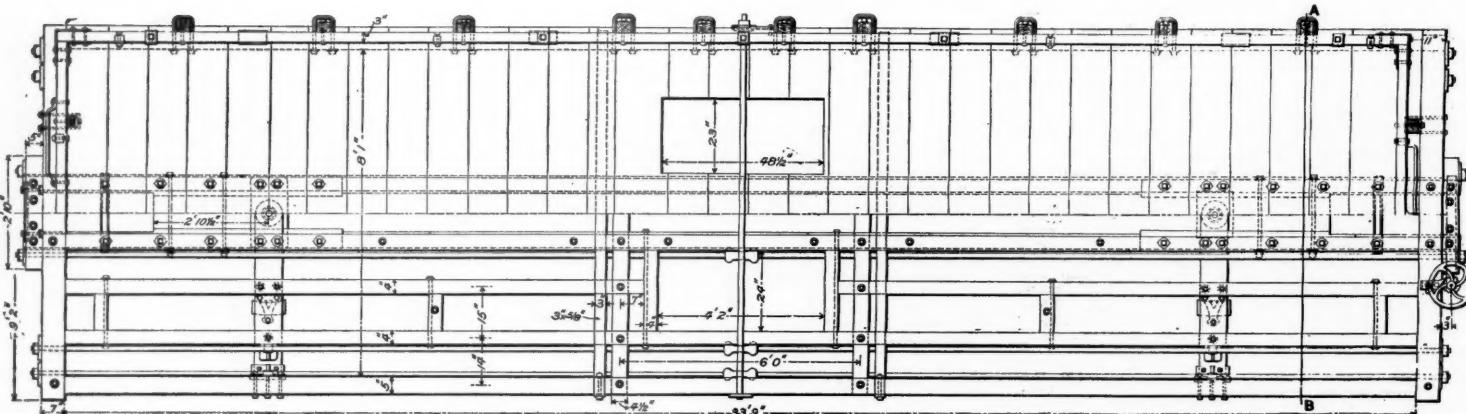


Fig. 2.—Plan.

Elevation and Plan of Cleveland, Lorain & Wheeling 60,000-lb. Gondola Car.

held at present is only 544 miles. During the year 334 miles have been placed in receivers' hands and 1,751 miles have been taken out. The strong tendency toward consolidation is a fact "worthy of the attention of the legislature," but the Board, having no jurisdiction, makes no recommendation. Where one road has acquired the control of another the Commissioners have always applied their rule, which requires the rates on all roads under the same control to be made the same as though the whole of the lines belonged to one company.

The reports of various roads had not come to hand in time for use in the Commissioners' report, but they hope during the coming year to be able to issue a supple-

mentary, and the Commissioners think there ought to be a disinterested sworn weigher at important points. They have adopted a rule forbidding any extra charge for long lumber occupying two cars when the weight of the load is greater than the aggregate minimum carload weight for the cars used. There have been many complaints about the interchange of traffic between railroads, where the traffic was interstate, but the Commission could not satisfactorily adjust them and legislation is recommended.

The railroads of Georgia, like those everywhere else, are slow in refunding overcharges, and the Commissioners recommend a law requiring the road to pay the expenses of a suit, including attorney's fee, where a just

these cars. They are 34 ft. 11 in. long over end sills, with an inside length of 33 ft. 2 1/4 in., and it is the intention to use the same under frame for both center drop bottom and plain gondola cars, with the exception that two of the intermediate sills are cut off just inside the needle beams in the center drop-bottom cars and extend all the way through in the plain gondolas.

The side elevation is shown in Fig. 1 and a half plan of the car and of the under frame in Fig. 2. The end elevation and a section on line A-B are shown in Figs. 3 and 4 respectively. Fig. 2 is the plan for a center drop-bottom car, the other drawings being for a plain gondola. The center sills are 4 1/2 in. x 8 in., and spaced 18 in. apart, to allow for the construction of the draft rigging, which

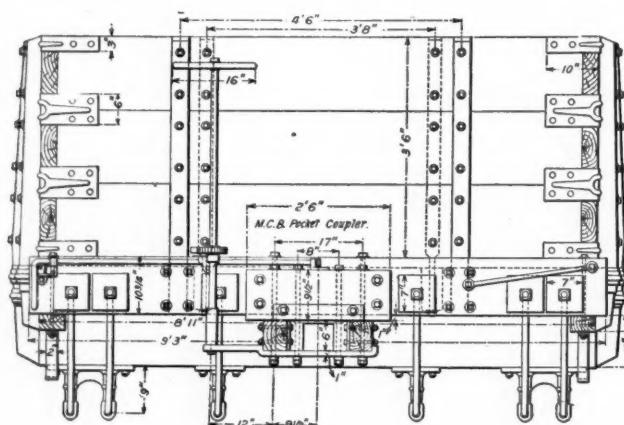


Fig. 3.—End View.

Cleveland, Lorain & Wheeling 60,000-lb. Gondola Car.

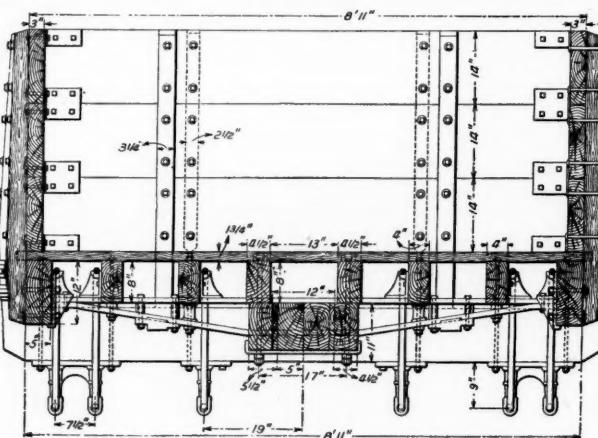


Fig. 4.—Section on line A-B.

mentary report. They have made earnest efforts to get statistics of intrastate traffic, but have been unable to get them. The Eatonton branch of the Middle Georgia & Atlantic was complained of as unsafe, and the Commissioners, after inspecting the road, gave orders for the renewal of rails and sleepers, but the road did not comply in a satisfactory manner, and the case has been referred to the Attorney-General.

Peach growing has become an important industry in Georgia, and the shippers complained of high rates to Eastern cities. The Commissioners had no jurisdiction, but they referred the case to the Interstate Commerce Commission and hope for a favorable decision from that

overcharge claim is not paid within 30 days. They also want a law empowering the Attorney-General to give more substantial help in enforcing the orders of the Commission. The report recommends that sleeping cars be made subject to the Board, the same as common carriers.

The report gives a table of street railroads in Georgia, of which there are 23. They have 281 miles of road, the assessed valuation of which is \$1,674,068. Occasional complaints against street railroads are made to the Commissioners, but they have no authority in the matter, and the necessity for a law regulating street roads is pointed out.

is a departure from the usual practice. They have 1 1/2-in. x 1 1/2-in. tenons fitting into mortises in the end sills, and are gained out 1/8 in. for the body bolster. They are not cut out to receive the needle beams, but are placed directly on top of these and are bolted to them with 1/4-in. bolts. The four intermediate sills are 4 in. x 8 in., and are similarly constructed except in the center drop-bottom cars, where the two outer ones are cut off at the headers. The side sills are 5 in. x 12 in., with 1 1/2-in. x 1 1/2-in. tenons fitting into mortises in the end sills. They are also cut out on the ends to receive the end sills, and a tongue 3 in. deep extends underneath the end sills. They are bolted to needle beams and end sills with 3/4-in. bolts.

The end sills are 7 in. \times 11 in., mortised to receive tenons of longitudinal sills, and are flush with the top of the car flooring. The needle beams are 4 $\frac{1}{2}$ in. \times 11 in., cut out 4 in. at the ends to receive the side sills. All of these are long leaf yellow pine. Dead wood blocks 2 ft. 6 in. long, and faced at the lower edge with a $\frac{3}{8}$ -in. \times 3-in. \times 17 $\frac{1}{2}$ -in. wrought-iron strip, are bolted to the end sills. It will be seen, too, that 4-in. \times 8-in. brake hanger blocks, with 1 $\frac{1}{2}$ -in. \times 1 $\frac{1}{2}$ -in. tenons, are put between the intermediate sills 4 ft. 2 in. on each side of the body bolster. These blocks are plowed out to receive a $\frac{3}{8}$ -in. bolt, which holds

Buckeye coupler is used on 650 of these cars, and the Tower coupler on 300.

The flooring is 1 $\frac{1}{4}$ -in. oak and is flush with the tops of the end sills. The siding and end boards are 3-in. oak. They reach a height of 3 ft. 6 in. and are fastened to the sills by $\frac{1}{2}$ -in. \times 2 $\frac{1}{4}$ -in. tie straps lipped over the boards at the top and forged to $\frac{3}{8}$ -in. diameter where they pass through the sills. The sides are held by oak stakes set in malleable iron pockets bolted to the sills by the usual "U" bolts. The stakes in line with the needle beams are extended flush with the bottom of these beams, thus

with 4 $\frac{1}{4}$ -in. \times 8-in. journals are employed, and the journal boxes have malleable iron lids. Malleable iron washers are put between the heads of the column bolts and top arch bars. The spread of the truck is 5 ft. The center plate is malleable iron.

The cars are furnished with Westinghouse automatic air-brakes, with quick-action triple valves. The Master Car Builders' Association standard attachments for outside hung brakes are used. The brakebeams are hickory, and are trussed with $\frac{3}{8}$ -in. rods. They are fitted with malleable struts, malleable washers on the ends, Christie heads and cast-iron shoes. The draft and truck springs were made by the E. French Co.

Some Railroad Matters in England.

Light Railroads.—Last night the President of the Board of Trade introduced into the House of Commons the new Light Railway Bill, prefacing it with a speech in which he stated that, from returns which he had obtained, he found that in one single county there were 234,000 acres of cultivated land distant upward of three miles from a railroad station. He further said that after personal investigation he had come to the conclusion that we in England had better take example by the Belgian *Vicinal* system of railroads of the simplest possible form, running as a rule on the high roads, rather than by the more perfect but much more expensive railroads "of local interest" in France. He hoped, moreover, that we should be able to adapt to our own circumstances the Belgian system of co-operation for finding the money between the state, the local authorities and private enterprise.

The bill may be summarized as follows: There is to be established a Light Railway Commission of three members, to which, subject to the control of the Board of Trade, will be transferred the power, hitherto reserved to Parliament alone, of sanctioning new light railway schemes and authorizing, where necessary, the compulsory taking of land. The Commission will decide what modification of the existing technical regulations as to methods of construction and working may reasonably be permitted in each individual case. The question of gage is left entirely open. Special precautions will be taken that lines, which, either from the importance of their probable traffic, or from the fact that they compete with existing lines, or for any other cause, ought not to escape the control of Parliament shall not be sanctioned as light railways. A light railway may be promoted, constructed and worked either by a local authority, or by an existing,

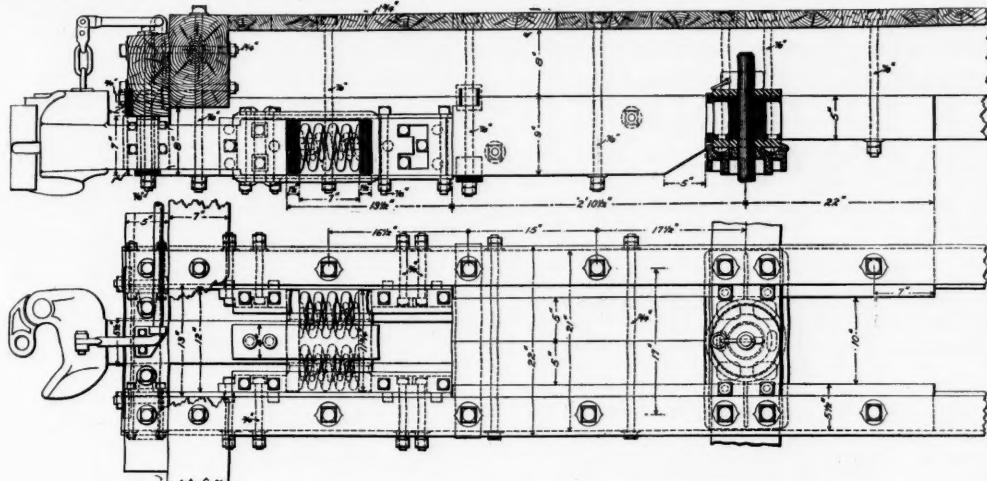


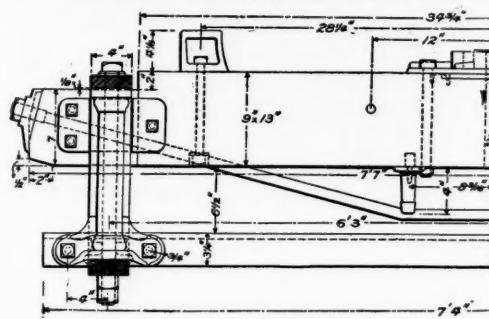
Fig. 5.—Draft Gear for C. L. & W. Gondola Car.

the intermediate sills together here. Cross tie straps of $\frac{3}{8}$ -in. \times 3-in. wrought iron extend over all the sills and are lipped over the side sills, where they are bolted with $\frac{3}{8}$ -in. bolts. These are placed just outside of the needle beams and serve to hold the frame solidly together. In the case of the center drop bottom car, 4-in. \times 8-in. headers, spaced 4 ft. 2 in. apart, are put between the center and outer intermediate sills. The two inner intermediate sills are cut off here, and have tenons fitting into mortises in these headers. The center and outer intermediate sills are here held together with a $\frac{3}{8}$ -in. bolt.

The frame is trussed with six rods 1 $\frac{1}{2}$ in. diameter, enlarged at the ends to 1 $\frac{1}{4}$ in. The same casting forms the queen post at each needle beam for the two outer rods. In the plain gondolas these queen posts are 9 in. high, but in the center drop-bottom cars the four inside posts are 11 in. high and the truss rods are moved closer together, so that they end on the dead wood blocks which are in this case 2 ft. 10 in. long.

Filling pieces, 4 $\frac{1}{2}$ in. \times 5 in., are put between the ends of the draft timbers and needle beams, and similar pieces are also put between the two needle beams. These are bolted to the center sills with $\frac{3}{8}$ -in. bolts. The body bolsters are made of wrought iron the upper plate being $\frac{3}{8}$ in. \times 8 in., and the lower plate 1 in. \times 8 in. A cast-iron

following out the manner of secondary bracing recommended by the M. C. B. Association at their last convention. Between these stakes are two extra ones to further strengthen the sides. Pressed steel corner bands both within and without serve to make a strong joint between the siding and end boards. As will be seen from Figs. 1 and 2, the end stakes are put inside the end sills and are held by $\frac{3}{8}$ -in. \times 2 $\frac{1}{2}$ -in. straps forged to $\frac{3}{8}$ -in. where they pass through the sills. The end boards at that end of the car where the hand brake wheel is located, are inside the stakes, thus giving an 11-in. platform for the brakeman to stand on. At the opposite end the boards are outside the stakes leaving but a 4-in. projection of the



Truck Bolster.

filling piece with a hole for the king bolt is put in the center between the two plates, the king bolt inserted from below, and passing through the bolster only. It is secured by a key above the top plate of the body bolster and can be removed without removing any load that may be in the car. Malleable iron center plates and cast-iron side bearings are employed.

The draft rigging shown in Fig. 5 is very strong. The draft timbers are oak 5 $\frac{1}{2}$ ft. thick and 9 in. deep back to the body bolster, where they are cut off to 5 in. deep to pass between the plates of the bolster. They are bolted to the center sills by $\frac{3}{8}$ -in. bolts with their heads in cast-iron cup washers let into the car flooring as shown. The draft timbers are gained 1 in. so as to form a shoulder for the back jaw casting to butt against. This casting is farther held by filling blocks between the center sills, which extend from the back jaw casting to body bolster. The usual bolts hold the draft timbers together, and as a further precaution against spreading there is a strap $\frac{3}{8}$ in. \times 3 in. lipped over on the ends and held by two $\frac{3}{8}$ -in. bolts. Immediately above this strap is a malleable iron key between the center sills and draft timbers. The key extends across the draft timbers and has flanges on the ends to prevent spreading either of the center sills or draft timbers. Two coils of two springs each are employed, small malleable iron teats, bolted to the follower plates holding these coils in position. The yoke, 1 in. \times 4 in., is held firmly in place by extra wide pocket straps. The carrier iron at one end of the car is extended so as to form a support for the brake staff. The Little Giant

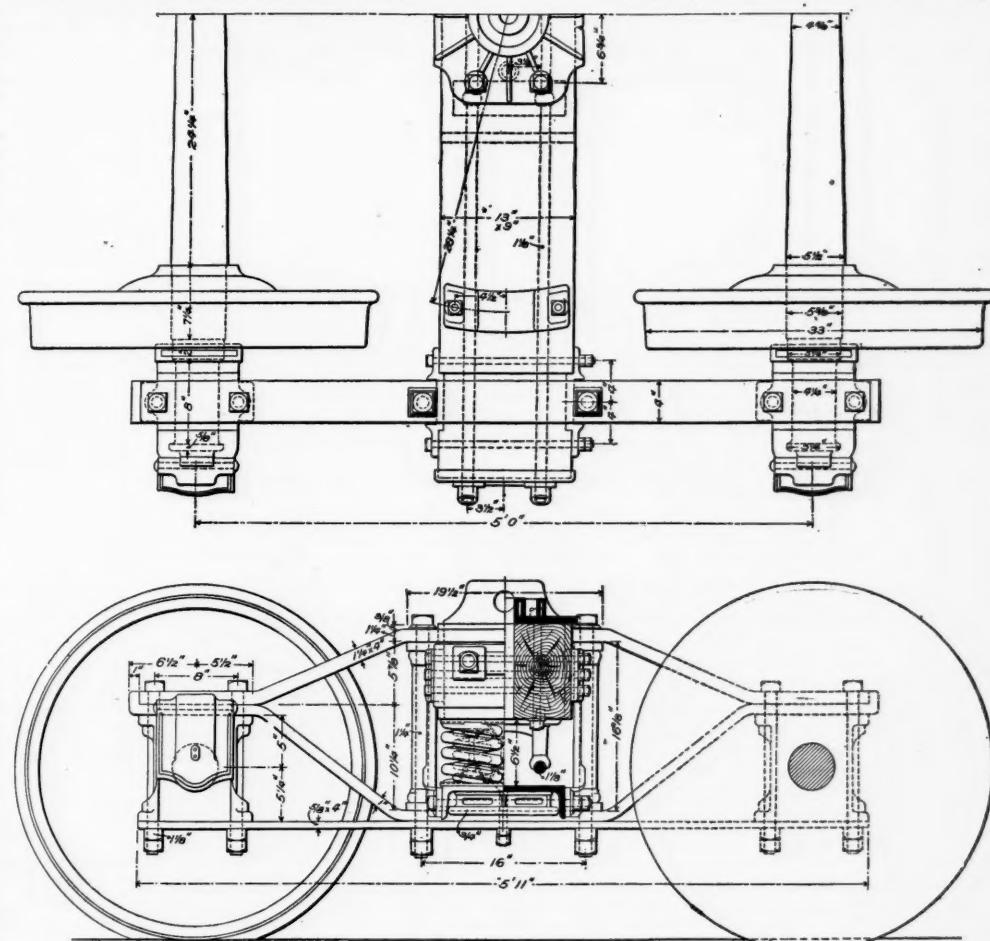


Fig. 6.—Details of Truck, C. L. & W. 60,000-lb. Gondola Car.

end sill. All tie straps are bolted to siding and end boards with $\frac{3}{8}$ -in. bolts. The location of steps and grabirons is plainly shown by these figures.

The trucks shown in Fig. 6 are of the rigid diamond type, with 13-in. \times 9-in. oak bolsters, trussed with 1 $\frac{1}{2}$ -in. rods. The upper arch bar is 1 $\frac{1}{4}$ in. \times 4 in.; the lower is 1 in. \times 4 in., and the tie strap $\frac{3}{8}$ in. \times 4 in. A 12-in. channel weighing 30 lbs. per foot forms the spring plank. This channel is inverted, and its flanges are cut out $\frac{1}{8}$ in. to receive the lower arch bar. A cast-iron filling piece is put between the channel and arch bar, and $\frac{3}{8}$ -in. bolts hold it between the bolster column. Iron axles

or by a new railroad company. If the local authority constructs the line, the state may assist, and both the state and the local authority will be authorized to subsidize lines built by a company. The subsidy may take the form either of a loan at 3 $\frac{1}{2}$ per cent., or of a subscription for shares, or, in the case of the state and in certain specified districts, of an out and out grant. It is provided, however, that the contributions of the state shall not exceed £1,000,000 in all, or one-fourth of the cost of any individual line, and that no state aid shall be given unless private enterprise shall have found at least 25 per cent. of the necessary capital. Moreover state grants

will apparently be confined to cases where an existing company enters into an obligation to construct and work, which the President of the Board of Trade hopes they will, as a rule, be prepared to do.

The bill was well received by the House of Commons, though Mr. Bryce, the late President, lamented the departure from the hereditary English rule of leaving private enterprise to its own unaided efforts. He warned the House that the grant of £1,000,000 would only serve "to stimulate not to satisfy" the appetite of promoters, and pointed out that, as no company would ever build a light railway unaided as long as there was the remotest chance of State aid being given, the practical effect of a small fixed State contribution would be to check rather than to encourage light railway enterprise. I must reserve to a future letter any comments of my own on the proposed measure and on its reception by the public at large.

The question of state competition with private enterprise has already arisen in Ireland in an interesting manner. Here, two small narrow gage systems, largely constructed with public money, are endeavoring to unite by building some fifteen or twenty miles of intermediate line practically paralleling a main line of the Great Northern Railway. The proposal cannot be carried into effect without the sanction of Parliament. But the Executive Government will probably not find it necessary to express any opinion. They are certainly not likely to do so unless compelled, seeing that the situation is complicated by the fact that Mr. Thomas Robertson, the General Manager of the Great Northern Railway, has just been appointed Chairman of the Commissioners of Public Works, who are the authority controlling the Irish Light Railways.

The Farmers.—The endeavor of the great railroad companies to induce the farmers to help themselves have been carried further since I last wrote, but apparently the farmers decline to be helped. Combination to consign traffic in wholesale quantities they combine to declare impossible and even undesirable. Both the Great Western and the North Western companies have published officially the result of their investigation into the subject. Here is the North Western summary of the result of interviews with not less than a thousand farmers "Number in favor of combination, exceedingly few, and no general apparent desire to alter present system of dealing with their produce. More than one-half of those seen showed absolute indifference in the matter." Here are similar summaries from the Great Western district: "Any attempt to disturb the existing system would give general offense all round." "I regret to say we cannot get sufficient definite promises of support to warrant me in recommending that the proposal should be tried as an experiment. . . . The farmers seem indisposed to help themselves or to speculate, and until they show some disposition to help themselves I do not see how we can help them." "Inquiries show that the proposed rate would not be of any service, as senders are so wily to keep their business relations secret from other traders."

There is another point of view from which the railroads are giving ever more and more help to the agricultural interest, and this point has been much dwelt on lately at the half-yearly meetings of the shareholders of the great companies. As the agricultural value of land grows less while simultaneously the local expenditure for public purposes increases the proportion of the local rates paid by the railway companies increases with startling rapidity.

New Projects.—I mentioned last month the two principal railroad projects which were to be submitted for Parliamentary sanction, namely, the purchase of the Hull & Barnsley Railway with its dependent Dock at Hull by the North Eastern, and the construction of a new trunk line from London to South Wales. The expectation that the former scheme would be abandoned has proved true. The ship owners using the Port of Hull were practically unanimous in its favor, but the opposition of the public at large was so determined that the North Eastern Company has withdrawn its bill.

Very unexpectedly the South Wales Railway bill has met a similar fate. On the one hand, the promoters seem to have found more difficulty than they expected in obtaining their capital; on the other, the Great Western Railway Company adopted an unusually conciliatory attitude and promised, and has in part already granted, very important concessions. Chief amongst these is a marked improvement in the passenger service as between South Wales and London.

Long Runs.—Since the beginning of January one train runs without stopping from Newport, on the further side of the Severn Tunnel, right into Paddington Station, 143½ miles, in 178 minutes without a stop, the longest run but one in the British Isles. This, however, is only one out of many remarkable passenger train improvements recently introduced by the Great Western Company. Since their purchase of the famous Swindon Refreshment rooms, which, as all the railway world knows, the contractor for the original railroad built gratis, as well as the station, on condition that all trains should stop there 10 minutes, the Great Western have several trains which run without a stop between London and Bath (106½ miles) in two hours, and between London and Bristol (118½ miles) in two hours and a quarter. Indeed the increase in the number of long runs in this country in the last two or three years has been quite remarkable. I question whether even the United States can show as many runs of 100 miles and upward without a stop as this small island. The following list, giving all runs of this length, with the name of the company con-

cerned, and the fastest time, may perhaps be found interesting:

Name of company.	Run between points.	Miles.	Fastest time.	No. of times a day.
London & North Western	London (Euston) to Crewe	158	185	1
Great Western.	Newport to London (Paddington)	143½	178	1
London & North Western	Crewe and Carlisle	141	160	2
North Eastern.	Newcastle and Edinburgh	124½	140	3
Midland	London (St. Pancras) to Nottingham	124	143	1
Great Western.	London (Paddington) and Bristol	118½	135	2
Caledonian	Carlisle to Stirling	117½	139	1
Great Western.	London (Paddington) and Bath	106½	120	5
London & North Western	Wigan and Carlisle	105½	120	2
Great Northern.	London and Grantham	105½	116	12
London & South Western.	London to Christchurch	104	136	1
Caledonian	Glasgow and Carlisle	101½	121	3

In all 34 runs per diem, averaging 113½ miles in length and done at an average speed of 50.8 miles per hour.

It will be noted that in the above table the Great Northern, which has long had the reputation of being the fastest line in the world, only appears once, and then near the bottom. Common fairness, therefore, compels me to point out the Great Northern as a small line, and this is its only possible chance of running a full 100 miles. Further, whereas the other companies only accomplish the performances given above once or twice, or at most three times (in one instance five) in the day, the Great Northern does the run between London and Grantham without a stop no less than twelve times, and in every case at a speed within a very few minutes of that shown above. It is hardly necessary to add that all these trains carry third-class passengers at ordinary fares. On many of them it is becoming customary to reserve seats in advance, and in every case where this is done no extra charge is made for the convenience.

Some New Passenger Stock.—With long runs such as these the necessity of placing lavatory accommodation within the reach of all classes is becoming obvious to everyone. Consequently all the new rolling stock that is built for express traffic, at least on the great lines, makes such provision. The Great Western has lately turned out a very convenient type of carriage. It contains two first-class compartments, communicating with one another and with a lavatory; one of the two is a coupe, but of extra length so as to afford room for armchairs against the windows. Between them the two compartments have seats for 10 persons. Next there is a second-class compartment, with seats for seven, with lavatory attached. Beyond this again there are three third-class compartments, seating 18 and opening to a corridor leading to the third-class lavatory. The furthest end of the carriage, whose total length is 58 ft. over the body, is occupied by a compartment for the guard. It will be seen that a carriage of this description is complete in itself, a great advantage where through services are given on cross country lines, as, for instance, from Penzance to Newcastle or from Paddington to Aberystwith.

Another recent development in rolling stock, this time a sleeping car belonging to the three companies which jointly work the East Coast service to Scotland, deserves a word of notice. This car accomplishes the long-desired object of giving each passenger a room entirely to himself. The beds are placed across the carriage, much as in the sleeping cars belonging to the Compagnie Internationale des Wagons-Lits, with the important difference that there are no upper berths. The charge for a bed in these cars is from three to five shillings in addition to first-class fare. Another company whose name I am not at present at liberty to mention is at this moment building new sleeping cars of similar design.

Earnings.—The accounts of all the great English companies—the Scotch accounts come later—for the past half year have now been published. They show a considerable and general improvement both in gross and net receipts. The 12 principal companies earned last half year £31,500,000 as against £33,200,000 in the corresponding half year of 1894, and of this more than £800,000 was clear gain. So it would seem not only that trade has greatly improved, but also that the rise in railroad servants' wages and decrease in their hours of labor has reached its culminating point, at least for the present. At the time of writing the improvement is still gaining strength. The Great Western receipts for the current week show an advance of no less than £22,000 over the corresponding week of the previous year, while 21 principal companies have amongst them an aggregate increase of £136,000, or over 10 per cent.

I mentioned in my last letter the retirement of Mr. Cockshott after 55 years' of railroad service. He only lived some five weeks to enjoy his well-earned rest. On Feb. 7 he returned home late in the evening, and apparently quite well, but suddenly felt faint, and expired before a doctor could be summoned. He was probably the last man left who had actually transacted business with George Stephenson.

W. M. ACWORTH.

LONDON, Feb. 21, 1896.

Tests of Cast Steel Projectiles.

Some recent and rather surprising tests of cast steel projectiles made at the Indian Head proving grounds, by the United States government, have developed the fact

that a solid cast steel projectile can be made that will show results considerably in advance of the shells made in the usual way of forged steel, and then hardened.

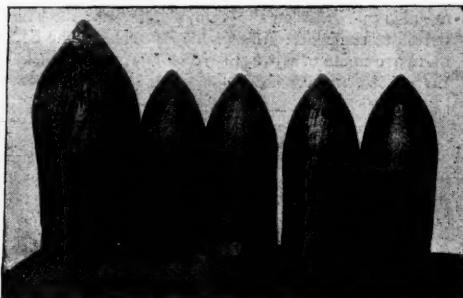
The makers of armor-piercing projectiles abroad, especially those making the Holtzer shells, have seen the desirability of making a projectile solid in order to more effectually penetrate the heavy steel plates that are now made, but have hitherto found it impossible. It is necessary in order to penetrate the hard surface of the Harveyized plate, that the surface of the shot should be as hard as possible, since the surface of the Harveyized plate is so hard that it will cut glass. In hardening the projectile, however, the process of hardening, which is

an expansive process, reduces the specific gravity of the steel, hence the thickness of the projectile must not be greater than will allow the hardening process, if applied to the exterior, to extend entirely through. Since it is impossible to harden a piece of steel six inches in diameter all the way through uniformly, it has been necessary to bore out the interior which could not be properly hardened, thus preventing destructive internal stresses. This is the reason why all armor-piercing projectiles as now made are made hollow. Messrs. Isaac G. Johnson &

o., of Spuyten Duyvil, N. Y., have succeeded in making a cast-steel projectile solid and also of sufficient hardness to penetrate a Harveyized plate. The extreme hardness of such a plate is of course on the surface. In order to aid the point of the hard projectile while entering the plate this company has supported the point with a soft steel cap, as shown in the engraving. This cap expands as the point of the shot advances embracing it firmly on every side, and this prevents its flying off until the point has entered, when it will take care of itself by the support of the plate. These caps have been used before, but generally with forged shells, and with only fair results.

The immense amount of friction produced in penetration also partially fuses the cap, which, as it were, lubricates the projectile and reduces the friction. The heat is so great that in the recent tests the heavy oak backing was set on fire, back of the plate. It has been found that the cap is nearly all carried into the plate by the friction and in the melting. Johnson projectiles fired without a cap, as compared with the well-known Sterling-Wheeler projectiles, penetrated about 30 per cent. more than the Sterling-Wheeler, while all the projectiles fired with cap went entirely through the plate and upset uniformly .05 in., showing the uniformity of the shells. This improved plate was a Harveyized, 9-in. plate, forged down to 7 in. after Harveyizing, and then hardened.

In the course of two or three weeks it is expected that 8-in. and 12-in. projectiles will be tested, and also some more 6-in.



Johnson Cast-Steel Projectiles, After Testing.

Last October four 6-in. projectiles were fired at an improved Harveyized, 6-in. plate, putting through four clean holes, the projectile in addition going through 2 ft. of oak and 10 ft. of dirt. This plate was not supported by the oak backing, but was two feet from it, which gave it an opportunity to spring. In that shape it had broken up all 6-in. projectiles previously tried. These four 6-in. projectiles, shown in the accompanying engraving, were taken from the dirt at the rear of the butt. There is shown at the left, an 8-in. projectile that was fired at an 18-in. Harveyized plate at a velocity of 2,000 ft. per second, and after penetrating 10½ in. it rebounded 34 ft., being whole and only slightly upset. At the same time a 12-in. projectile was fired at this plate, which penetrated the plate, 3 ft. of oak and 10 ft. of earth. This we are informed is the first time that a 12-in. projectile has ever penetrated an 18-in. Harveyized plate.

Prohibition of Useless Railroads.

The good effects of the "backbone" manifested by the Railroad Commissioners of New York in dealing with applications to build new railroads are already apparent, and vigorous utterances like that of President Blackstone of the Chicago & Alton seem to be having their effect here and there. The annual report of the Railroad Commissioners of Illinois, recently issued, comes out in plain terms for the repression of irresponsible schemes for new railroads, as follows:

"Nearly all of the railroads in the state have at some time been bankrupted, and the original investors have been subjected to great losses. To the general law, which authorizes the unrestrained construction of railroads, bankruptcy and other financial embarrassments of the railroad companies may be largely attributed. This law enables irresponsible scheming promoters to obtain

a franchise for a mere trifle, and by means of false and fraudulent misrepresentations as to the value of such franchise, to induce capitalists to invest money to build a new road through a territory that is already occupied by a road which meets the requirements and necessities of the public. The result of the construction of such road is a division of tonnage, undue reduction of rates, poor service, and, in many instances, bankruptcy to both old and new companies.

"While it is true that the operation of these unnecessary roads has been continuous, yet the character of the service is poor and unsatisfactory to the public, the physical condition is unsafe, and the revenues so small that employees are compelled to wait weeks and sometimes months for their wages.

"Under the present incorporation laws of the state of Illinois any number of persons not less than five may become incorporated as a company for the purpose of constructing and operating a railroad; under this law more than 900 franchises have been granted for the construction of railroads. Many of the lines for which franchises have been obtained have never been constructed, but by reason of purchase, consolidation or leases, only 117 proprietary and subsidiary lines are now in operation in this state.

"The franchises in many instances have been obtained without any intention on the part of the promoters of carrying the project into execution, but merely for speculative purposes. This is manifest injustice to lines already established and in operation, and as the granting of a franchise alone does not conserve any public good, such certificates of authority should not be granted unless the proposed line of road meets some public necessity.

"However aggressive the policy of railroad companies may have been in the past, it can no longer be successfully contended that they are beyond the power of legislative authority. It is therefore apparent that the action of the State and National governments, tending to adjust the relations between the public and the railroads in their quasi public position, should also, as far as practicable, tend to protect them in their vested rights.

"As there can be no controversy as to these facts and as the present eligibility of the lands of the state to the railroads already constructed is so complete and uniform, it seems clear that there should be legislative enactment restraining the construction of unnecessary and destructive new roads. This authority should be lodged in an impartial tribunal that will be promoted only by a desire to do equal and exact justice to the corporation seeking recognition and the people.

"We therefore recommend that a law be enacted to carry into effect the suggestion here made, believing, as we do, that it is in the interest of the people of the state."

The St. Louis *Globe-Democrat*, commenting on the Illinois Commissioners' report, says: "There is a similar situation in all of the other Western states. Railroad building has been pushed far beyond all legitimate demands, and the result has been detrimental in every way. As a general rule, the competing and intersecting lines, constructed on the pretext that they were needed to provide the public with adequate transportation facilities, have merely served to introduce disturbing and mischievous factors and to develop irregular methods of doing business. Nine-tenths of the cases of railroads passing into the hands of receivers are directly attributable to this cause. Where the amount of business is not sufficient to maintain the roads operating in a given territory, the chances are that they will all fail sooner or later.

Simons' Drop Door for Gondola Cars.

Mr. James E. Simons, Assistant Master Car Builder of the Pittsburgh & Lake Erie at McKee's Rocks, Pa., having learned from experience the serious defects that exist in the bottom openings of many coal and ore cars, has designed a door with a fastening made on the principle of the beveled bolt of an ordinary spring lock, as applied to doors, box lids, etc., and the illustrations shown here-with explain the construction of the apparatus.

In the iron districts gondola cars are used for ore, limestone, ashes, coal and pig iron, and, to meet all requirements should be so made as to be unloaded with facility either over the side or through the floor. Most drop doors are located in the center of the car, so that often a good deal of work is required to carry a portion of the load from the ends to the center. Drop doors when closed usually are supported by chains attached to a roller bar laid across the tops of the sills, from which very unsatisfactory results have been obtained on account of the chains being exposed to corrosion by the sulphur of the coal and by their being in the way when unloading the contents of the car. In the winter season the roller bar becomes frozen so that it is impossible to turn it, and the chains frequently have to be broken before the doors can be opened. In winding up it frequently occurs that one chain will wind faster than the other; the result is one door is closed tight and one left partly open. If loaded in this condition, as they often are, the load is suspended by one chain, which sometimes gives way and scatters the contents of the car on the tracks. Even if no damage results, the car loses considerable of the loading and bills for shortage come in. Before such a car can be repaired the entire load over the doors must be moved. Consignees in unloading cars equipped with doors in the center, dig holes in the floors near the ends for the purpose of dropping contents through, and thus make expense for repairs to floors.

Mr. Simons makes two openings in each car and locates them at any point between the crosstie timber and the inside axle. The door is made flush with the floor when closed and it cannot be fastened until it is completely shut. All the operating mechanism is below the floor and easily accessible, whether the car is loaded or empty. The doors being located near the ends of the car facilitates unloading and leaves valuable space between the crosstie timbers for air-brake apparatus.

The method of operation is as follows: Assuming that the doors at one end are open and it is desired to close them: the winding wheel, shaft and spool *A* are turned, the chain *B* is wound on the spool and the doors are drawn up. In their upward course they strike against

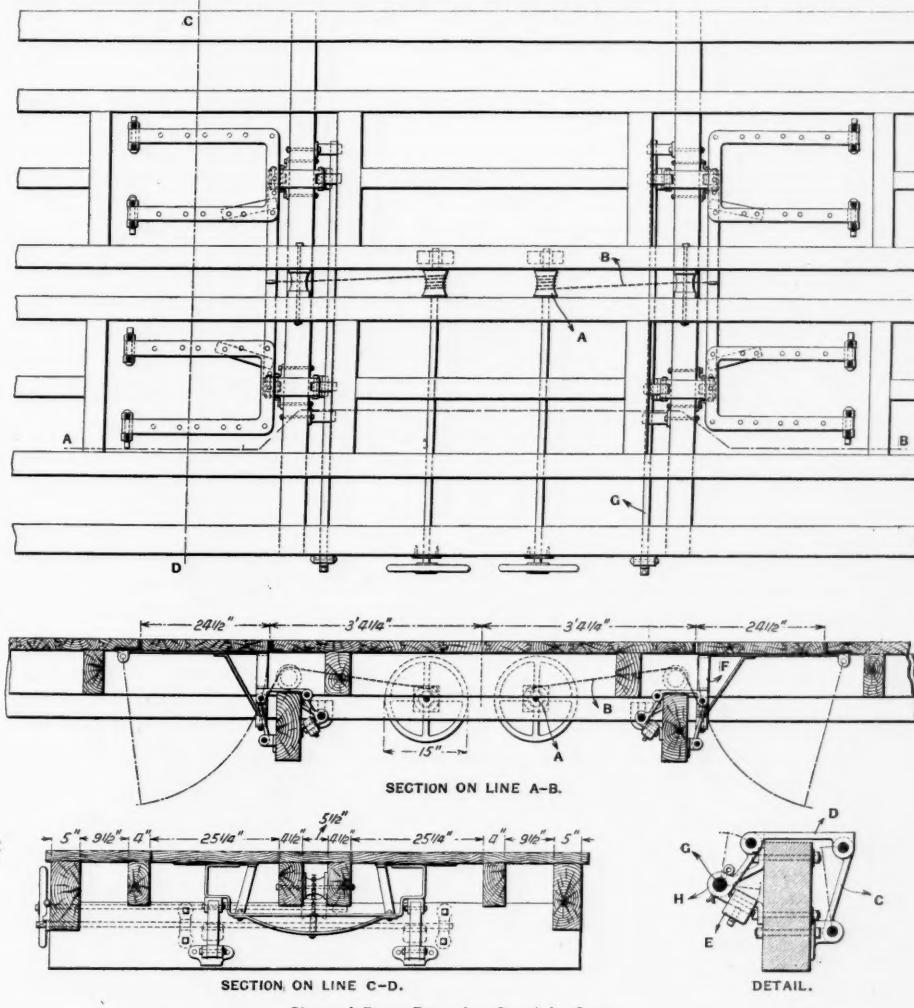
the face link *C*, forcing it back toward the cross-tie timbers, carrying with it moving plate *D*, at the same time raising weight *E*. As soon as the connecting bar *F* is clear of moving plate *D*, the weight *E* drops and forces plate *D* out under the connecting bar *F* and thereby forms the support.

The doors are dropped by operating rod *G*, which is supported by brackets attached to the crosstie timber, and is secured to the weight crank *H* by a cotter. One end of the operating rod is made square. By applying a wrench to this square end, and turning the rod toward the center of the car, the moving plate *D* is withdrawn from under connecting bar *F*, and the doors must drop of their own weight. The winding chain carries no portion of the load.

This device is now in use on 500 Pittsburgh & Lake Erie gondola cars and 200 coke cars; also 200 Washington Coal and Coke Co. cars and 200 J. H. Somers' Fuel Coal Co. cars. It is also applied to six box cars used by the Calumet & Blue Island. It is inexpensive to maintain and is giving entire satisfaction. It can be applied to any kind of a car without interfering with standard con-

dition, besides the Siberian Railroad, both for the State and the companies. For many years until recently very little new railroad was built in the country. There are besides about 1,500 miles of railroad in Finland, which has an independent and constitutional government, although the Czar is the monarch.

At a conference of representatives of Russian railroads to consider how the fast freight and express service might be improved, it was shown that on the line from Moscow to St. Petersburg in a given period 67 to 80 per cent. of all the fast freight consisted of perishable goods. Of the fast freight shipped to St. Petersburg, 60 per cent. was forwarded by passenger trains, and about 15 per cent. in ordinary freight trains. On the average the shipments by passenger trains moved about 335 miles per day; those by other trains from 195 to 250 miles. On other railroads the movement was from 180 to 330 miles per day. In transfers at junctions six hours were lost, on the average. This was considered satisfactory service, and the establishment of a faster freight service was considered unnecessary. The conferees resolved in favor



Simons' Drop Door for Gondola Cars.

struction, and is not limited as to location or length, except by the distance from floor to rail. On box cars it can be locked or sealed the same as side doors.

Foreign Railroad Notes.

The new railroad opened in the German Empire during the year 1895 amounted to about 1,087 miles, against 500 miles in 1894. About 435 miles opened last year were built under the provisions of a Prussian law of 1893, providing for light railroads ("small" railroads so-called) and private tracks making junctions with established lines. The longest single line opened had a length of less than 45 miles.

In the equipment of the Danish state railroads figure many "ice boats." There are 36 at one station and 24 at another and smaller numbers at several other stations. These are used for the most part in place of ferryboats when the straits, etc., which interrupt the railroads, are frozen over and still smooth enough for an ice boat.

The Transcaspian Railroad in the seven years of its existence ending with 1894 earned, gross, \$11,600,000, and net only \$143,000, having cost about \$12,500,000. It must be remembered that it was not built to make money. The southeast frontier of the Russian Empire would not be easily defensible without it.

Last December the Russian Minister of Transportation reported that the entire length of railroad in Russia was 21,944 miles, of which 14,475 miles belonged to the State. The length of double track was 4,890 miles. This is so much more than has been reported heretofore that we presume it includes the Transcaspian Railroad, and the completed parts of the Siberian Railroad, which are not usually included in statements of traffic, earnings, etc. A considerable number of new lines are under construc-

tion of the following time allowance for carrying cattle and perishable goods: For distances not exceeding 1,250 versts (830 miles), 250 versts (166 miles) per day; for greater distances 233 miles per day. For an express service for perishable goods, the shippers should be guaranteed a speed of 200 miles per day for distances not exceeding 400 miles; thence to 1,200 miles, 267 miles per day, making a time allowance of five days for 1,200 miles. For greater distances, 333 miles per day should be allowed.

There was completed last summer a new railroad along the west coast of Italy from a junction 45 miles south of Naples to Reggio, nearly opposite Messina, in Sicily, a distance of 227 miles. The approach by rail to Sicily heretofore was made by going nearly due east across the peninsula, 169 miles from Naples to Metaponto, on the instep of the boot, and then following the sole of the foot, south, southeast and finally around the toe northward a little way to Reggio, 267 miles further. The time required was 21 hours, which was some hours longer than the steamer voyage between Naples and Messina, and naturally even the comfort of a Pullman sleeping car, which was attached to the through train, attracted few passengers, especially as the fare was nearly \$16, to say nothing of the sleeper. By the new line the distance of 272 miles between Naples and Reggio is made in 13½ hours. There is a Pullman car, as before and the cars are ferried across the straits, only a few miles below Sylla and Charibdis, to Messina. The construction of the new line has extended through many years and has been very costly. There are about 100 bridges of considerable size on the line, and 82 tunnels, one about 3 miles long, one 2½ miles, 2 about 2 miles, and 15 more from ½ to 2 miles long. There are no considerable towns on the route and the railroad must compete with the sea at the numerous ports on the line.



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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN OPINIONS, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The Massachusetts Supreme Court has rendered a decision in the case of W. B. Kidder, of Concord, vs. the Fitchburg Railroad, practically forbidding exclusive contracts between railroad and express companies. Suit was brought to compel the Fitchburg to handle express packages for the plaintiff regardless of an exclusive contract between the road and the National Express Company. The court decides that the plaintiff is entitled to a mandatory injunction, which shall secure for him the privilege of doing express business on the passenger trains of the road, with facilities and terms equal to those furnished to other express companies doing business over the road, having regard to the amount and character of the service, and also to the reasonable regulation of the business as may be required for the public interest and the efficient operation of the railroad. Kidder brought this bill in equity under Chapter 469 of the acts of 1894. This law makes the non-discrimination clause of the general railroad law (Section 188, Chapter 112) apply to local express companies and to persons "desiring to engage in" the express business, who may obtain the recommendation of the railroad commissioners. Kidder failed to get such a recommendation, evidently because he could not show sufficient experience in the business to warrant the commissioners in the assumption that he could control enough business, or could do it with the requisite efficiency, if he got it, to justify an order disturbing the existing methods of conducting the express traffic. (Many local expressmen ship goods to and from Boston in freight cars.) The court seems to have broadened the law into a general permit for all comers to have space in baggage cars.

Such a law must work considerable injury to the older and larger express companies in Massachusetts, unless their rates are very reasonable. With low rates they can easily make hard-sledding for the newcomers, though energetic men, thoroughly acquainted with a limited field, often succeed in giving better service than a large company, with less flexible methods, can put into effect. As a multiplicity of messengers is bothersome both at stations and on the cars, the railroads naturally favor a monopoly, and they can do this easily if they so desire. Of course, if the existing monopoly fails to get the business, letting it go either to freight trains, where the railroad probably earns less, or to wagons where it loses the whole, it is to the interest of the road to have a little competition in the baggage car. But the limit is soon reached, and when competing messengers became so numerous that they cannot afford a slice of the car big enough to stand in, the railroad is justified in making the minimum price large enough to freeze out the small fry. If public sentiment demands further letting down of the bars than this, the road ought to do its own express business and shut out all the companies. This the Massachusetts law allows, of course. The Fitchburg ought to be able to make a favorable con-

tract with the National for interchange at its junction points with other roads where the National operates.

The British Board of Trade has recently issued its report on one of the most serious accidents (not so much in its direct as in its indirect consequences) of recent years, that, namely, on Dec. 10 at the St. Neots Station on the Great Northern Railway. In this case the night Scotch express was running at about 60 miles an hour through St. Neots, when a portion of the train left the rails and ran into some coal cars standing in a siding, with the result that two carriages were wrecked, two passengers were killed, and 17 injured more or less seriously. After the accident one of the rails over which the train had just passed was found to be broken into no less than 17 pieces, none of them over 22 in. in length, while the companion rail was in four pieces. There is no doubt whatever that the rail broke under the weight of the driving wheel of the engine, and that owing to the speed of the train the engine and the first two vehicles got over before the effect of the breakage was felt. The succeeding vehicles broke up the rail still further, and so threw the tail of the train off the track and caused it to run sideways through a crossing into the coal cars. The broken rails have been subjected to careful examination both microscopically and also by chemical and mechanical tests. The inspecting officer's opinion is very distinct to the effect that "the first fracture of the rail took place at a minute induced flaw which did not exist at the time the rail was manufactured, and which could not have been detected by the naked eye. . . . The steel may be considered to have been originally of good quality." These rails, according to the report, were portions of a small lot of 500 tons purchased as long ago as 1873, but probably out of use for some years during that period. They were 21 feet in length, and weighed originally 80 lbs. to the yard, but the rail which broke into the 17 pieces had been reduced by wear to only 70 lbs., while its companion still weighed a little over 72 lbs. per yard. Since these rails were laid, the Great Northern has advanced its standard section for the main line to 84 lbs. per yard. In view of the fact that the latest engines have 20 tons weight on the driving axle, the inspecting officer urges a further advance from 84 to 90 lbs. On the question how far steel rails, originally of good quality, may undergo a progressive but concealed deterioration, he prudently expresses no opinion whatever.

The Philadelphia & Reading, whose engines were the first in this country to make 60 and 70 miles an hour in regular service, but whose speed records have within the last few years been approached on many roads, and equaled by some, has evidently determined to again take its place at the head of the list, and has announced that on Monday next a regular train will be put on, over the Reading and the Central of New Jersey, to run from Philadelphia to New York, in one hour and 45 minutes, 15 minutes less than the fastest present schedule. The new train will consist of Vauclain compound locomotive No. 378 (having but one pair of drivers) and three cars, all the cars being vestibuled. There will be a combination car, an ordinary passenger car and a parlor car. The three will weigh about 100 tons. The engine is of the same style as No. 385, which was described in the *Railroad Gazette* of Aug. 9 last, though it has, we believe, more heating surface than the latter. No. 385 weighs 55½ tons with 24 tons on the drivers. The drivers are 84 in. in diameter and the four truck wheels in front are 36 in. The trailing wheels under the firebox are 54 in. in diameter. The firebox is 8 ft. wide inside, and the fuel is fine an thracite coal. The stroke of the piston is 26 in., and the diameter of the cylinders is 13 in. (H. P.) and 22 in. (L. P.); working steam pressure, 200 lbs. per sq. in., and total heating surface 1,460 sq. ft. The new train will leave Philadelphia at 8:20 a. m., and is scheduled to reach Jersey City, 90.2 miles, at 9:53. Stops will be made at Columbia avenue, Philadelphia, and at Wayne Junction. The speed has to be slackened twice to take water and in crossing the bridge over Newark Bay, nearly two miles long, as well as at numerous railroad crossings. The time between Wayne Junction and Elizabethport (at the west end of the Newark Bay bridge) is 70 minutes and the distance 75½ miles, making the speed between these points 64.7 miles an hour, which seems a trifle fast for a Philadelphian. The speed through from Philadelphia to Jersey City is 58.2 miles an hour. The Empire State Express, New York to Buffalo, 440 miles, travels at 53.33 miles an hour, including stops. The westbound schedule of the new Reading train will be six minutes slower than that of the eastbound, the time of leaving Jersey City being 4:41 p. m., and

of arrival at Philadelphia 6:20. Two other additional express trains are to be put on between New York and Philadelphia.

The Report on the Nicaragua Canal.

At last we have the full text of the report of the Board of Engineers appointed by the President a year ago to examine into the Nicaragua Canal matter. When this Board was appointed we announced our purpose to cease further discussion, and to suspend judgment until the report was made. Last November, when some of the main facts were made known through what may by courtesy be called "journalistic enterprise," we published them as highly probable, but felt bound to treat them as still of uncertain authenticity. The full report now received confirms those facts as published, and adds a great amount of knowledge and opinion.

At the outset we may say that we are not surprised at the industry and fidelity of the Board, or at its knowledge of what the engineer has done, or may be expected to do; or at its familiarity with the great forces of nature and how these may be "directed for the use and conveniences of man," and how they may work for his destruction. Nor are we surprised at the temperance and restraint with which the members of the Board express themselves, or at the wisdom with which the subject has been treated. All of these qualities we expected from the composition of the Board. We are amazed, however, at the amount which the canal company does not know about the vast work that it has undertaken, and at the light-hearted confidence with which it has asked individuals and the nation to embark upon the most difficult engineering work ever undertaken by men.

In January, 1893, we attempted to show how very imperfectly the canal project had been studied by its promoters, from the engineering side. We did not attempt then, nor have we attempted since, to carefully consider or discuss the question whether or not commercial, political or military considerations would justify the building of the canal. We laid down, however, and attempted to maintain, the proposition that not enough was known about the engineering difficulties to be encountered to warrant anybody, either the nation or private capitalists, in undertaking the work. We said, "all of these very important matters, which we have stated and briefly discussed, are presented to the careful consideration of Congress before it involves this country in an expenditure of \$100,000,000 with another sum of the same or greater size to follow." We asked, "would it not be well to make haste slowly in this matter, and, while considering it, to send to Nicaragua a government commission of experienced and capable engineers, employed by the general government and paid by it? This country cannot afford to imitate the French people by going blindly and without fully exhausting the question, into any interoceanic canal scheme." We are disposed to think, and have very good reason for thinking, that the careful analysis of the evidence for and against the practicability of the project which we made at that time had a great deal to do with the appointment of the Board of Engineers, whose report is now before us. In what follows, we shall try to present briefly some of the facts and opinions brought out by the Board, and it must be remembered that the Board was, by its instructions, confined carefully to a study of the project from the engineering standpoint alone. The other great considerations involved have not been touched by it. In what we say now we shall confine ourselves to one point, the entire insufficiency of the knowledge of physical facts yet obtained by any one.

In the beginning, we may state again the main and most important conclusion of the Board, which is that perhaps the canal as proposed can be built for \$133,472,898, and perhaps it cannot be. This is the best estimate that could be made with the information before the Board. It must be expressly understood that this estimate is only a provisional one. Furthermore, the opinion is expressed that the necessary data for a final project will require 18 months' time, covering two dry seasons and the expenditure of \$850,000. The latest official estimate of the canal company is \$66,466,880, or something less than half the provisional estimate of the Board. It is interesting to observe here that the estimate under the Childs project in 1852 was \$31,538,319. Under the Lull project of 1873 the estimate had risen to \$65,722,147. The estimate of Mr. Menocal in 1885 was \$64,036,197. In 1890 the present canal company had raised the estimate to \$65,084,176.

The key of the whole enterprise is in rainfall and drainage. All of the engineering works depend upon the amount of water available for use, and the amount that may act to wreck them. The whole work rests necessarily on these facts, but "on these

points the existing data are seriously defective both in respect of number and continuity." At Graytown the record for three years shows a mean rainfall of 267 in., a maximum of 297 and a minimum of 214. On the west side a record kept by an American resident for 14 years shows a mean of 65 in., a maximum of 105 and a minimum of 32, but there is reliable information of rainfalls of 3 in. in one hour and 9 in. in nine hours and of 35 $\frac{1}{2}$ in. in eight days. In passing we may note that the most disastrous flood ever known in the United States, the Johnstown flood of 1889, was the result of a reported rainfall of 8 to 10 in. in from 18 to 36 hours. "A record of nearly 25 ft. of water in a year on the Caribbean Coast diminished to 5 ft. between the lake and the Pacific Coast needs no comment to indicate the important results that must ensue with reference to the matters of local drainage and engineering constructions."

We have said that the whole project turns upon this question of rainfall and drainage, but the canal company has made no careful gagings of the water courses at any point. The only information available as to the flow of water is from gagings made by Colonel Childs in 1851 and Commander Lull in 1873, during brief periods of field work, but these took account mainly of low water data only, to determine if there was a sufficient supply for an ordinary low level canal. When we consider that "the company's project calls for the construction of numerous dams and embankments of magnitude, some of them without precedent in engineering practice and all involving serious hydraulic problems," one must be astonished at the neglect of the canal company to secure accurate information in this particular.

The maximum and minimum discharges from the lake as assumed by the canal company are greatly in error. The assumed minimum is 11,390 cu. ft. per second and the maximum 18,059. Estimates made by the company of the supply available for lockage are based upon the mean of these, and here again one is surprised at the obvious neglect of the fact that the available supply must be measured by the minimum and not by a mean. The Engineer Board thinks there is reason to believe that the maximum may be double and the minimum as little as one-half or perhaps one-third the quantities assumed by the company. Furthermore, the company's computations ignore the important fact that the lake has a range of from 5 to 15 ft. between the highest and lowest stages. This indicates one direction in which more information must be obtained, and information which is absolutely essential to any intelligent design or estimate.

The report informs us that the company kept a river gage record at San Francisco Island, 12 miles below the proposed site of the Ochoa dam, but "unfortunately the record for the first seven months, including the highest stage and the lowest stage observed, is missing." The company assumes that 42,000 cu. ft. per second is the high flood discharge, but this, the Board says, represents in fact "only a moderate flood, probably not much greater than the mean discharge." From data other than that supplied by the company the Board concludes that the flood discharge Jan. 7, 1888 was about 125,000 cu. ft. per second. But there is reason to believe that even this is not the highest flood discharge and the Board is of the opinion that until more reliable data are obtained the maximum discharge at Ochoa should not be estimated at less than 150,000 cu. ft. per second. We shall speak later of the Ochoa dam project, the most critical single work of the whole scheme. It is enough to call attention to the fact here that the company bases that project on a flood discharge of 42,000 cu. ft. per second while the Board of Engineers is of opinion that nothing less than 150,000 cu. ft. should be provided for.

Another matter of the greatest importance is the variation of the level of the lake. "Every foot of reduction in the minimum will cause a large increase in excavation throughout the entire summit level, including the costly work in the San Juan River and the east and west divides. . . . Continuous observations should be made for not less than one year and including at least one high stage of the river." Indeed, the Board is of opinion that such observations are absolutely indispensable, and a single year's record might be misleading if the high stage were of unusually short duration; but "the canal company has no recorded observations of the lake level or other data relating to its regulation for the eight years since it began work in the country. The matter is of such vital importance that observations ought to have been made continuously during the entire period."

At the beginning of the summit-level, going westward, is an opening which the company proposes to close with a concrete dam. The crest of this dam will be 750 ft. long, its height above the bed of the Deseado River will be 63 ft., but

"no borings have been taken at this site, and it is not known whether a suitable foundation for a concrete dam can be found."

To go from the sea up to the summit level, 106 ft. of altitude, according to the company's project, and 110 according to the recommendation of the Board, three locks are provided by the company and four are recommended by the Board. These, of course, would be constructions of the first order, involving an expenditure, according to the company's engineers, of \$3,300,000, and, according to the Board, of \$7,600,000. "The canal company has no detailed plans of the locks and other structures for which its estimates are made and the Board has had to prepare preliminary drawings for the lock estimates." Fortunately, the Board was singularly well equipped to do this, but it seems remarkable that serious estimates of the cost of the locks should ever have been made without any detailed plans. In fact the Board has felt obliged to increase not only the estimated quantities of work but the unit prices. For example, the company allowed \$6 per cubic yard for concrete work, which is only about two-thirds the actual cost of concrete of similar composition used on a large scale in the locks of the Hennepin Canal. Furthermore, the only borings made at the sites of the locks were with an earth auger. These, the Board concludes, when taken in connection with observations of the clay in the railroad cuts, indicate that the material will give a fairly satisfactory foundation for the locks, "unless local variations from general characteristics should be disclosed by fuller exploration."

We come now to the great divide cut, one of the most costly parts of the whole work (company's estimate, \$12,000,000; Board's estimate, \$17,000,000). This cutting is 3.15 miles long with a maximum depth of 324 ft. The total excavation amounts to 11,700,000 cu. yds., 70 per cent. of which is rock (16,600,000; 87 per cent. rock, by the Board). The company's estimate of the quantity of excavation is based on a cross-section having vertical sides from the canal bottom to 10 ft. above water, there a berm 5 ft. wide and above this a slope of one horizontal to five vertical. The company made diamond drill borings along the center line of this cut at intervals of about 1,000 ft., but the cores obtained in these borings have not been preserved further than a few samples. These samples with the scanty notes of the chief of the boring party and such examinations of the outcroppings as the Board could make, constitute all the information now available for this colossal work. From this information the Board concludes that flatter slopes must be used, involving an increase in the amount of excavation. But a very serious fact indicated by the borings is that at great depths below the surface the rock is more or less decomposed and may crush when the excavation is made and cause the sounder rock above to fall. The Board observes "the absence of good field notes and the loss of the cores are particularly unfortunate in these cases. New borings from the center line and also on the sides of the cut are indispensable and should be made under the constant supervision of a capable engineer." The Board regrets exceedingly its inadequate discussion of this the most costly part of the whole work, but the information available is so scanty and defective that the matter cannot be treated in a satisfactory way.

Another engineering construction of considerable importance is certain guard gates, which the company has estimated for in the stretch between the east divide and the San Juan River, 12.26 miles. It is proposed by these gates to cut off communication between the basins through which the canal will run and the San Juan River, but there are no drawings or plans for these gates.

Passing westward we came to the line of the San Francisco basins. To hold the water in these embankments are projected to dam the valleys of rivers and close other depressions along a line of about 15 miles. These embankments are 67 in number, with an aggregate crest line of about six miles, and one of them 1.2 miles long will rise 85 ft. above the bed of the river. Borings in the beds of two rivers show soft mud 30 ft. deep and two swamps have not been examined and the depth of mud in them is not known, nor is the width of these deep mud bottoms known. Several of these dams must stand 100 ft. above their foundations. These great dams must endure the floods due to observed rain falls of nine inches in nine hours, or three inches in one hour. Surely if ever an engineering work needed careful study it is this. The difficulties and dangers to be met during construction are but the beginning, unless the dams are built with the most perfect care and skill; and even then the completed canal will be exposed at multiplied points to breaches made for the definite purpose of stopping navigation.

We come now to the Ochoa dam, the "main prop of the company's project," a single vast work esti-

mated by the company to cost \$977,000 and by the Board to cost \$4,000,000, on which hangs the "burden of the great constructions that stretch in both directions to constitute the waterway." This is to "sustain the volume of a reservoir nearly 3,000 square miles in area" and to determine the character and cost of works aggregating about half the cost of the whole enterprise. Its "failure would leave the navigation stranded, wreck the valley below and possibly wash Greytown into the sea;" it "would mean destruction to property and population from the dam to the sea and suspension for several years of navigation through the canal." Furthermore, faults of design, dimensions and construction which would come short of causing the destruction of the dam itself would impair navigation, and endanger the smaller works.

Obviously a work so vast in its dimensions so vital in its relations and so entirely without precedent in the world must have been studied minutely from the foundations up; and the regimen of the river above it must be accurately known. On the contrary, only 17 borings are recorded; these were made with earth augers, pipes and sand pumps; no drills were used; only five borings were made in mid-stream and these did not penetrate through the sand "because the pipes became clogged with gravel." Only one gaging of the river was made and "that is of no present value, for the stage of the river when it was made is not known." No detailed plans or specifications of the dam have been made, but the company's chief engineer assures the world that "the method of construction will be quite simple." The company assumes the maximum discharge at 63,000 cu. ft. per second but the Board says that "high floods discharging as much as 125,000 and possibly 150,000 cu. ft. per second are to be expected at intervals of a few years, and the dam is likely to be subjected to such floods during construction and subsequently."

This part of the Board's report is very full and carefully studied and should be read with the greatest care by every one who has any responsibility in the matter. We cannot undertake to do justice to it here but have endeavored merely to indicate how absolutely the company's engineers have failed to realize the tremendous responsibility which they took up when they projected this part of their work. The Board recommends great changes in the design of the dam and multiplies its cost by more than four, but warns us that its estimate is only tentative. A great deal more must be known about the facts to be met before the site of this dam can be fixed or an adequate plan for it made, or its cost closely estimated.

We have now passed the point of greatest danger, the Ochoa dam, and the single work of greatest cost, the divide cut; but much remains yet to be told. The same insufficient study of the project is seen all the way to the Pacific. Our review of this able report, although so long, has only covered 32 miles out of the total of 170, and we shall probably take the matter up again. We have said enough, however, to show any reasonable mind that it would be stupendous folly, nothing less, to assume the burden of this enterprise without the further studies which the Board advises.

Annual Report of the Missouri Pacific.

The annual report of the Missouri Pacific for the year to Dec. 31 shows a general improvement in traffic, a good increase in earnings and the reduction of the deficit to less than a third the amount reported in 1894, although during the year more than one million dollars was expended out of earnings for improvements. The floating debt has been funded during the year into 10-year 5 per cent. collateral trust notes, and the finances are now in good condition. This floating debt was created in 1893, and in the report for 1894 it was stated as over \$5,600,000 for the Missouri Pacific proper, and nearly \$3,000,000 for the St. Louis, Iron Mountain & Southern. These sums represent the advances made by the directors to the companies, and it would appear as if the Missouri Pacific was saved from a confession of insolvency only by the concentration of these large liabilities in the hands of its management. Obviously such services on the part of directors, to a corporation which they manage, are quite unusual.

The results of operations on all lines (excluding the Central Branch Union Pacific and Arkansas & Louisiana) for three years were as follows:

	1895.	1894.	1893.
Gross earn.....	\$22,672,603	\$21,800,615	\$24,018,338
Oper. exp.....	17,121,110	16,483,475	18,257,168
Net earn.....	\$5,650,863	\$5,317,170	\$5,761,170
Other income.....	1,031,881	741,439	1,543,711
Total income.....	\$6,782,744	\$6,058,609	\$7,304,881
Fixed charges.....	7,322,991	7,991,905	7,196,076
Deficit.....	\$590,247	\$1,933,356 (Sur.)	\$108,865

This shows an increase in gross earnings of \$871,358, or 3.8 per cent., and an increase of \$333,694, or 5.2 per cent. in net earnings. The ratio of expenses, which has been high on the Missouri Pacific, is now decreasing in spite of the large expenditures for improvements. It was 81.5 per cent. of the gross earnings in 1893, 75.6 per

cent. in 1894, and 75.1 per cent. in 1895. Including taxes the percentages are 86.25 in 1893, 79.72 in 1894 and 79.09 in 1895.

The income from traffic, it will be noticed, is large, and the increase in 1895 more than equals the increase in net earnings. This increase is partly accounted for by dividends of \$105,000 from express and refrigerator company stocks, but it also includes "interest accruing from Iron Mountain general consolidated railway and land grant mortgage bonds, \$137,000; from Iron Mountain gold funding notes in treasury, \$62,000," or \$199,000 of the \$340,000 increase.

The mileage was 4,938, a decrease of 54 miles, accounted for by the surrender to the Missouri, Kansas & Texas, in September last, of the line from Paola, Kan., south of Kansas City, to Holden, Mo., which has been operated for many years under lease. It is now used by that company as part of Kansas City-St. Louis line.

The earnings from traffic were divided as follows:

	1895.	1894.	Inc. or Dec.
Freight.....	\$16,891,299	\$15,374,833	I. \$520,566
Passenger.....	4,236,831	3,992,580	I. 241,351
Mail, express and Rentals.....	1,481,847	1,395,355	I. 86,491
Miscellaneous.....	1,057,926	1,037,877	I. 20,059
Total.....	\$22,672,003	\$21,800,645	\$871,358

	Gross earn. per mile of road.....	\$4,558	\$4,367	\$191
Earn. per revenue train mile.....	1.43	1.42	.01	
Net earn. per mile of road.....	\$1,136	\$1,065	\$71	

Every item in operating expenses shows an increase, as will be seen below:

	1895.	1894.	Inc.
Conducting transportation.....	\$6,517,750	\$6,296,896	\$220,854
Motive power.....	4,465,281	4,381,516	83,765
Maintenance of way.....	3,873,328	3,769,182	104,145
Maintenance of cars.....	1,619,687	1,537,495	81,591
General exp.....	545,691	498,386	47,308

	Total.....	\$17,021,140	\$16,483,475	\$537,664
Expenses per mile of road.....	3,422.13	3,302.07	120.06	

The traffic statistics given in the report are very full, and indeed the company's reports for several years past have been very satisfactory in this way, and have contained all the information regarding the property which investors could desire. The statistics, as a matter of fact, are so detailed that it would be a convenience if more of the figures were summarized in totals in the first part of the report. Some of the more interesting figures are tabulated below:

	P. c.	Inc. or dec.
No. tons carried.....	7,169,166	6,772,669
" " one mile..	1,608,130,663	1,593,880,663
Av. frt. train load (tons).....	172	177.7
" " haul (miles).....	224.31	235.31
Rate per ton per mile.....	.988	.965
	I. 2.4	

The freight train mileage was 9,348,940, an increase of 4.2 per cent. The per cent. of loaded car mileage was 72.2 in 1895, an increase of 3.9 per cent. Passenger traffic statistics are given in the following table:

	P. c.	Inc. or dec.
No. passengers carried.....	1895. 4,473,587	1894. 4,360,434
No. pass. carried one mile.....	193,835,094	178,811,052
Average pass. journey.....	43.33	41.01
Rate per mile (cents).....	2.186	2.233
Pass. train mileage.....	6,426,315	6,347,021
	I. 1.2	

A French Experiment with Reduced Fares.

The effect of the reduction of fares on French railroads in 1892 has been studied by W. Heussler, an officer of the Swiss Central Railroad. The reduction was made by the railroad companies on condition of a reduction of a heavy government tax on tickets, which made part of the price paid by the passenger for his journey. Mr. Heussler compares the results for the year 1893 with those for 1891, the change having taken place in the course of 1892.

The public has certainly profited by the change, for, while the distance traveled increased from 4,766 millions of passenger miles in 1891 to 5,737 millions in 1893, the amount paid for fares and tax together fell from about \$81,500,000 to \$78,500,000; that is, the public got 20% per cent. more traveling for 3 1/4 per cent. less money.

The railroad companies, which for the first year or more were inclined to grumble at the change, latterly have appeared better satisfied, or less dissatisfied. Their receipts from the passenger traffic (*ex tax*, which they simply collect and turn over to the government) increased from \$66,300,000 in 1891 to \$70,000,000 in 1893, or 5.6 per cent. For a long series of years, excluding those when some special event, like a world's fair, has stimulated traffic, French passenger earnings have increased from 2 1/2 to 3 per cent. yearly. Therefore, it seems that the reduction of fares has had little or no effect on the gross earnings of the French railroads, taking them altogether. That the increase of one-fifth in the travel has been carried without some increase in expenses is very improbable, but it certainly has not been in proportion to the increase in travel.

The third party, the state itself, has suffered a loss in its receipts from ticket taxes, and but for the change it would have had some gain. Altogether, the experiment may be considered satisfactory; the French people have gained considerably, and more than enough to balance the loss in the income of the state, which they have to make good by other taxes. The railroad companies have not, so far, made anything by the change, and doubtless it was not intended that they should, and as a whole they have not lost much. In a few more years, probably, their profits from passenger service will be greater than if the old fares had been maintained; and meanwhile

they have been giving more for the same money, which ought to be a satisfaction, though it doesn't help to pay dividends.

The full text of the demurrage rules recently issued by the Railroad Commissioners of Georgia, and noticed in the *Railroad Gazette* of Feb. 28, shows various changes from the old rules which were not mentioned in the reports first published. The main criticism on these rules is that they are too long and attempt too much. They prescribe rigid procedure in certain respects where the difficulty of the conditions to be dealt with demands that the railroad agent has considerable latitude. Rule 1 requires railroads to give prompt notice to the consignee of the arrival of *all* goods. Why put this in a demurrage circular? Such a rule as this is looked upon by experienced lawmakers, as well as by experienced railroad men, as useless. Where notices are necessary the railroads generally give them of their own accord, while in the great majority of cases, where they are not necessary, much clerical labor is wasted. According to Rule 2 notices of freight on which demurrage may be charged may be sent by mail, but if the consignee swears that he did not receive the notice he gets off. We wonder whether there has been any real demand for such an absurd provision. Rule 3 allows a storage charge of one cent per 100 lbs. on freight in freight houses. This looks like a gracious favor granted by the state to railroads, and it might be thought to be a compensation for some of the restrictions of the demurrage rules; but as, practically, a railroad generally cannot bother with a storage charge at the freight house, the favor is not so valuable as it might seem. The principal demurrage clause, Rule 4, requires cars to be placed on an accessible track during the 48-hour free-time period, and thereafter they must be placed "on demand"; whether in one minute or half a day is not stated. When a consignee receives four or more cars the same day, all but the first three must have 78 hours' free time. Whether he has 4 or 40 makes no difference. Why should large traders be thus favored? The Georgia Commissioners will imperil their chances for re-election if they thus carelessly depart from the democratic rule of equal privileges to all. Consignees living more than five miles away must not be charged demurrage until they have had time by the exercise of ordinary diligence to unload the freight. Rule 8 says that when a road fails to place cars within 48 hours the consignee "shall be paid" \$1 a day for the delay, but *who* is to pay the money is not stated. The rule making allowance for weather says:

Whenever the weather during the period of free time is so severe, inclement or rainy, that it is impracticable to secure means of removal, or where from the nature of the goods removal would cause injury or damage, such time shall be added to the free period; and no demurrage charges shall be allowed for such additional time. . . . Rule 11 allows a demurrage charge where the shipper does not give prompt billing instructions; and, with a laudable desire to do full justice to the poor shipper it is provided that if the railroad does not send a car promptly forward when the billing is given, it shall be liable to the shipper for \$1 a day. If this rule were drawn with sufficient stringency, and were to be sustained by the courts, it would make a big snarl in transportation dealings, but as it does not say how far the car must be carried, and as this and all the other rules of the Georgia circular appear to have been drafted without very careful consideration of intricate legal bearings it will not perhaps be well to criticize it further at this time. Evidently, a road which finds a yard blocked and has difficulty in moving all freight with promptness, can evade the letter of this rule by moving the cars along, say, to the next station. It is as easy to comply as it is to obey some laws requiring work to be begun on a new railroad within a certain time—by moving one cart-load of "dirt."

We have received recently from the Acting Librarian of the Leland Stanford Junior University a letter concerning the review which we published some months ago of the very interesting and valuable catalogue of the railroad library of that institution. Mr. Teggart says that the accessions to the library in the last three months have been 2,000 items. As regards the point which we mentioned that the catalogue did not show very complete sets of the transactions of railroad clubs and societies, we are informed that requests were sent to all such societies asking for their co-operation in making the library complete, and only about three of them answered. Further efforts are now being made in that direction. We wish especially to call the attention of the railroad clubs to this matter. It would be for their interest and for the interest of good railroading in general that this library should possess sets as complete as possible of the *Transactions of all the railroad clubs*. Those *Transactions* have now come to be very valuable, and they contain some of the best literature of railroading that has appeared in the last two or three years. It is therefore especially important that complete sets should be preserved in as many public libraries as possible; this, not only for the immediate convenience of students who make more and more use of such libraries, but for the student and historian in years to come.

NEW PUBLICATIONS.

Directory to the Iron and Steel Works of the United States. Thirteenth edition, corrected to Jan. 1, 1896; 8vo., 320 pages. Philadelphia: American Iron & Steel Association, James M. Swank, General Manager, 261 South Fourth street. Price \$6 (25 shillings). The thirteenth edition of Mr. Swank's valuable direc-

tory contains one new and significant feature in a complete list of malleable iron works of the United States, and we find that in this industry, which has now become so important, 82 works are listed. Complete lists of plate and sheet mills and of tin-plate works, which, since the last edition was published, have grown considerably in numbers, are also given. The features of preceding issues are all retained, and these, as is well-known, constitute a very complete directory of iron and steel works of all classes, of bridge builders and ship builders; of locomotive works, car axle works, car wheel works and car builders. The volume has a good classified table of contents and the very complete indexes fill 14 pages. It becomes thus not only a complete but convenient book of reference for those who have business with iron and steel makers and with many of those who consume iron and steel in their business. The Directory is published once in two years. The last edition appeared early in 1894, and we are told that another edition need not be expected until 1898.

In the two years that have elapsed since the twelfth edition was published there has been more than the usual number of changes in iron and steel works, and in their organization. Many new enterprises have been undertaken, the most important increase having been in sheet mills and tin plate works.

The recorded number of blast furnaces now active, or that may become active, is 460, with an annual capacity of 17,373,637 tons. While the number of furnaces has decreased by 100 since 1892, the annual capacity has increased by more than 2,800,000 tons. The average annual capacity per furnace has steadily risen, as will be obvious from these figures. In 1876 that was 6,811 gross tons; in 1896 it had risen to 37,044. Actually there are reported in this directory 244 less furnaces than there were in 1876, but their total capacity is more than three and one-half times as great. Among the new furnaces that are certain to be soon completed and put in operation, the most important are the four new Duquesne furnaces of the Carnegie Steel Company, Limited. These will be the largest in the world. They will be 100 ft. high by 22 ft. at the bosh, and will have an aggregate annual capacity of 700,000 gross tons.

The charcoal furnaces have fallen from 118 in 1894 to 96 at the beginning of this year and the aggregate annual capacity of the charcoal furnaces has fallen from 1,285,000 tons to 1,099,000 tons.

In this edition 505 rolling mills and steel works are reported, against 487 in 1894. Forty-one have been built and 22 abandoned and one reclassified as not completed.

Five new standard Bessemer steel plants have been built in the two years. Of these there are now 44, with 96 converters, against 43, with 95 converters, in 1894. The annual converting capacity of the steel plants built and building on Jan. 1 was 9,472,350 gross tons of ingots and direct castings, against 7,741,000 January, 1894.

Eleven new open-hearth steel plants have been built in the two years and four have been burnt or abandoned. There are now 88 of these complete and four building. The annual capacity of these open-hearth plants built and building is now 2,430,000 tons, against 1,740,000 in 1894. This, it will be observed, is a great increase. In 1894 there were 28 open-hearth plants which were prepared to make direct castings and in 1896 there are 35 of them. The manufacture of steel castings has grown fast in recent years and has brought about a great change in general foundry practice.

No definite figures are given as to the production of basic open hearth steel, but Mr. Swank says that about one-half the open hearth steel works of the country which produce ingots now make basic steel. The manufacture of basic Bessemer steel has no existence in the country to-day, but the Troy Steel Company proposes to make it with three 15-ton converters at the new works now building on Breaker Island.

Probably the reader will be surprised to find that there are 10 more works using natural gas in whole or in part than there were in 1894, the total number now being 89. Of these 45 are in Allegheny County, Pa., 16 in other counties of Western Pennsylvania, one in West Virginia, five in Ohio and 22 in Indiana. The principal extension in the last few years has been in Indiana, but it must be observed that the total consumption of natural gas in the iron and steel works of the country is growing less and less from year to year.

Canada now has eight blast furnaces and 15 rolling mills and steel works, and Mexico is credited with 14 blast furnaces and 16 rolling mills and steel works; the iron and steel industry in the Dominion of Canada is making excellent progress.

The Erie Railroad System. By Ernest S. Cronise. New York: The Bond Record Publishing Company, 20 Nassau street. Price 25 cents. The March issue of the *Bond Record* contains several articles of unusual and permanent value. One of these is the conclusion of Mr. Wm. Griffith's careful study of the anthracite coal production begun in the February issue. The article to which we wish especially to call attention, however, is that on the Erie Railroad System by Mr. Ernest S. Cronise, incorporated with which is a special chapter on the Erie finances by Mr. Hamilton S. Corwin. The article fills 30 pages, and is embellished with seven maps and with diagrams showing earnings, operating expenses and fixed charges for nine years.

Not long ago we had occasion to mention the very thorough study made by Mr. Cronise of the Baltimore & Ohio, which was published in an earlier issue of the *Bond Record*. His study of the Erie is of the same sort.

He goes over the history of the system, describes its location, physical characteristics and physical condition; describes the terminals and the equipment and then gives statistics of traffic and earnings and of the financial situation, and concludes with a condensed description of the various properties embraced in the system. We shall attempt no review of the article now, but wish to call especial attention to it, as being a document which many men will want to have at hand for future reference as well as for present reading.

TRADE CATALOGUES.

Price List of Improved Hydraulic Jacks. Watson & Stillman, 234-240 East Forty-third street, New York city.

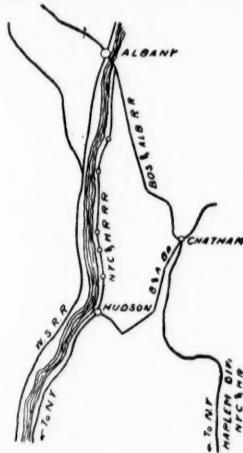
This is the 1896 edition of the list of jacks, hydraulic and screw, manufactured by the W. & S. Hydraulic Machinery Works. It is superfluous to say that a great variety of jacks is shown, for the output of this firm is well known. The new edition of the catalogue is made to conform to the standard M. C. B. size, and the type has been entirely reset, making not only a useful but handsome handbook. One of the new things shown is a claw jack with a large base. Until now, the firm has never made such a jack which it recommends. Heretofore such tools have been defective in taking too short a hold on the cylinder, with the result that either the cylinders were crushed in or the thread stripped. In the jack now offered a good hold has been secured. Another new article is a heavy jack with a double-piston outside pump, made to meet the call for something cheaper than the type having two complete rack and pinion pumps, and to give more freedom of working position. The pump is the same that has been used for some years on the Vreeland jack, in which the small piston works inside of a larger one. The large piston will exert a pressure one-third that of the smaller, and has a movement three times faster. Another new tool is a horizontal hydraulic jack with double piston pump and rack and pinion return to the ram. The makers say "the list is sent to all applicants who name the paper."

Hoisting Engines.—J. S. Mundy, Newark, N. J., has ready for distribution a pocket edition of his very complete catalogue of hoisting engines, steam boilers, etc. The book is fully illustrated, and contains about 70 pages. Copies, we are informed, will be forwarded to engineers, contractors and others interested, upon application, mentioning this paper.

The Blockade on the New York Central.

The Hudson Division of the New York Central & Hudson River railroad was blocked last week about four days by the most obstinate obstruction known to the officers since the road was built, and it was neither snow nor flood, landslide nor fire, though a flood caused it. It was ice, four feet thick, covering both main tracks for several miles and with surface so rough that only with great difficulty could men walk over it.

The rains and warm temperature of Saturday, Feb. 29, and Sunday, March 1, melted the snow throughout northern New York, and flooded all the streams. A creek emptying into the Hudson River at Stockport



Railroad Lines Between Albany and Hudson.

NOTE.—The stations on the main line of the New York Central, between Albany and Hudson, with their distances from East Albany, are as follows: Castleton, 8 miles; Schodack Landing, 12; Stuyvesant, 18; Coxsackie, 20, and Stockport, 23.

broke up before the ice in the Hudson had become much weakened, and floating down, made a dam which flooded the Hudson valley for miles north of Hudson, destroying some houses and many minor buildings, and doing much damage even to brick walls and other masonry structures. The Central's tracks here are only about five feet above the ordinary level of the river, and they were overflowed to the depth of several feet, and had to be abandoned between East Albany and Hudson on Sunday.

Before the water had subsided much a cold wave reduced the temperature to 25 deg. Fahr., then to 20 and finally to about 15, where it remained most of the time for two or three days, making a solid floor of ice over the comparatively quiet surface of the flood at the east side of the river. Meantime the Mohawk and other streams above Albany had broken up, and the ice came down the Hudson in large cakes; these were driven by a west

wind to the east side of the river and forced together so compactly that not much water was required to produce a body of new ice sufficient to make the whole into one solid mass. It was as hard to pick as any ice, in any shape, could be, and in addition the surface was so very uneven that not many men could work upon it at once. Most of the way for 12 miles, from Schodack to Stockport, this ice made a solid body over the track from 1 ft. to 4 ft. thick, there being three stretches two or three miles long where it was uniformly about 4 ft. deep. The subsidence of the water was not followed by any settling of the ice, to speak of, for the reason that the cakes almost rested upon the roadbed when the flood was at its height.

As soon as work could be begun the mass was attacked at both ends; but there was no place for the men to rest or to eat, or even to find temporary shelter, and they had to be fed in baggage cars. It was not until Thursday afternoon that one track, that farthest from the river, was opened. The work had to be prosecuted from the ends, like boring a tunnel. To have sent men, tools and supplies around by wagon to intermediate points, Stuyvesant and Coxsackie, would have made more delay probably than to concentrate the whole force at the ends. About 500 men were employed, but they had to spend more than a fourth of their time working ahead from the cleared track to the other end of the gang, owing to the difficulty of making headway on foot over the irregular surface of the ice. The cold being pretty se-

rumored that on each express train dispatched over the Harlem he sent an urbane "representative," to offer the passengers suitable apologies.

Drop Smoke Stacks for Roundhouses.

In answer to a request from one of our correspondents asking for an illustration of an adjustable smoke stack to carry off the smoke from locomotives standing in the roundhouses, we publish herewith two examples.

The first shown by Figs. 1 and 3 is that in use on the Chicago, Burlington & Quincy. It consists of a cast-iron stack, 19 in. outside diameter and $\frac{3}{8}$ in. thick, projecting $4\frac{1}{2}$ in. above a cap of the same material that rests on the roof of the roundhouse. This stack has nine slots $3\frac{1}{2}$ in. wide and 15 in. high cast in it near the upper extremity. On top of it rests a cast-iron cap. This stack is held in position by three guy rods $\frac{3}{8}$ in. in diameter. Extending down through the roof of the roundhouse is a similar stack 7 ft. 5 in. long and carrying on opposite sides near the top two 10-in. sheaves. Fitting inside of this is the adjustable jack, made of No. 14 galvanized iron, and of such a diameter as to slide easily inside the cast-iron fixed stack. The bottom of this adjustable portion terminates in a hood 50 in. in diameter. Two hooks are attached to this jack and serve as attachments for the chain carrying the counter-

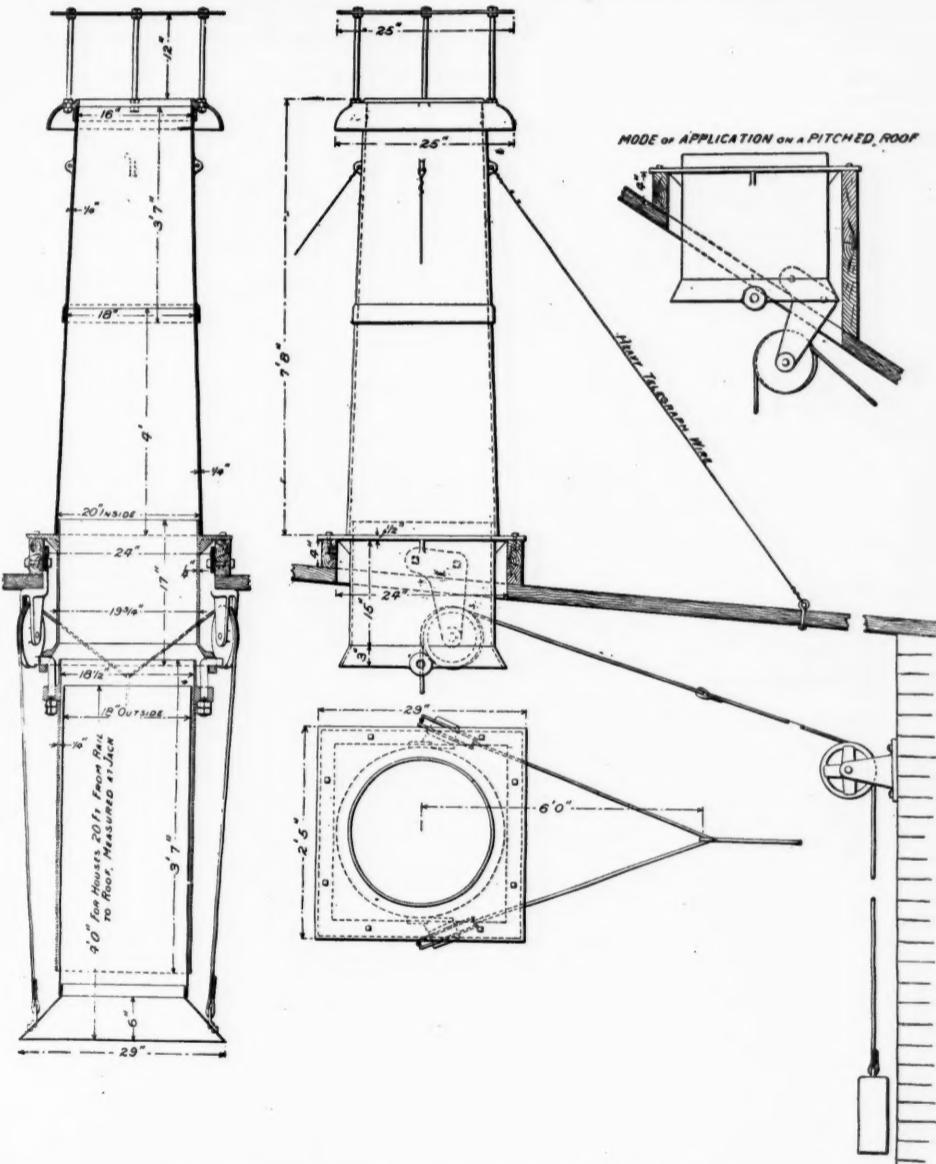


Fig. 2.—Chicago & Northwestern Drop Smoke Jack for Roundhouses.

vere only strong men, well clad, were worth anything, and little could be done except by daylight. The track and ballast were not much damaged, the comparative quiet of the stream and the fact that the ice was driven solidly against the east bank, preventing any grinding action.

About a dozen heavy express trains go over this road each way daily, besides numerous way trains and a great many freights, so that it may well be imagined that the inconvenience to the operating department was very great. Some trains had to be taken off; those which were run went over the Boston & Albany main line between East Albany and Chatham, 23 miles (double track, plain sailing); and south of Chatham either over the Harlem Division of the Central or the Hudson branch of the Boston & Albany. The latter is single track with poor facilities and has one grade of two per cent. The Harlem does not touch the main line between Chatham and New York City and it is single track for 105 miles, with facilities only for trains of moderate length. Besides this the scenery is very tame, to people who have read Mr. Daniels' advertisements, and it is

weight. The location and attachment for the chain and counterweight are clearly shown in the drawing.

Fig. 2 is the standard drop stack used on the Chicago & Northwestern Railway. It is very similar in design to the foregoing, consisting of cast-iron fixed portions, and a sheet iron adjustable jack. The cast-iron sheath, however, in this case is not cast integral with that portion passing through the roundhouse roof, but is swung from it by $\frac{1}{2}$ -in. bolts having hooked ends. The top of the stack in this instance is open, instead of being closed by a cap as before, and has a sheet iron plate 12 in. above it to prevent sparks being thrown up into the air. The adjustable jack is suspended by $\frac{1}{2}$ -in. wire rope passing over two sheaves held in brackets attached to the roundhouse roof. The hood in this instance is only 29 in. in diameter.

These two instances show common practice, although the details may vary somewhat on the different roads. That of the Chicago & Northwestern is of a later design than the one on the Chicago, Burlington & Quincy. An extended description of the two is not necessary as the drawings clearly show the construction.

THE SCRAP HEAP.

Notes.

Chief Engineer Brown, of the Pennsylvania, is making plans for changes of grades at a number of important street crossings in Washington, D. C.

President Ripley, of the Atchison, Topeka & Santa Fe, has ordered the re-establishment of the reading rooms, at several division terminals, which were closed several years ago when the road fell into financial straits.

The bridge of the Chicago, Rock Island & Pacific across the Mississippi, which had been impassable for about a week on account of a disaster to the temporary draw from floating ice, was reopened for business on March 2, a temporary structure having been completed.

The Railroad Commissioners of Missouri have notified the railroads that they must comply with the "blackboard law," requiring bulletins of expected passenger trains at all stations. It appears that this law has been in existence some years, but has not been observed.

The Bozeman tunnel, on the Northern Pacific in Montana, is again afire, and a dispatch from Helena last week stated that the damage was now beyond all estimate. Men had been set at work rebuilding the track over the mountain, where it had been undermined by the fire. The stoppage of this tunnel for months by fire was described in the *Railroad Gazette* of Dec. 27 last.

An order has been issued by the United States Court at Baltimore calling upon the Baltimore & Ohio Railroad account for the money, about \$400,000, held by the railroad as Trustee for the former Employees' Relief Association, which was dissolved several years ago. It is alleged that the money has been used by the company for its own purposes.

The Connecticut Game Transportation Law.

Next to the suit against Mrs. Leland Stanford, the most interesting case decided by the Supreme Court of the United States on March 2 was the case against Edgar M. Geer, involving the constitutionality of a statute of Connecticut prohibiting the transporting beyond the limits of the state of any woodcock, quail or ruffed grouse killed therein. . . . The case was briefly reported in the *Railroad Gazette* of March 6. The New York Sun summarizes it thus: The Supreme Court of Errors in Connecticut, before which the question was argued in 1891, declared that the game to which the statute referred was not an article of commerce within the meaning of the Constitution, and stated the argument in favor of the power of the state to prevent the export of such property in this way:

"It being conceded that the state, under its general police power, may lawfully prohibit the killing of the game birds in question, it may, of course, control such killing and the times and purposes thereof. It may lawfully enact that they may be killed and sold and held for sale only for domestic consumption. The state, in the exercise of its power, instead of prohibiting the killing altogether, permits the person killing them to acquire only a qualified right in them, namely, the right to appropriate them to his own use, and the right to sell or transport them for domestic use. . . . They become private property of a qualified character. The law limits the purpose for which they may be killed and become private property. The difference between private property of this sort and the ordinary private property of commerce is obvious."

These conclusions have now been approved by the Supreme Court of the United States in an opinion written by Mr. Justice White, of Louisiana. There is a dissenting opinion, in which Justices Harlan and Brewer concur, to the effect that game should be regarded as properly a subject of interstate commerce, and hence the Connecticut Legislature had no power to enact the prohibitory statute forbidding its export to other states.

It is not surprising that Mr. Justice Brewer was one of the dissenting judges. In 1877 he was a member of the Supreme Court of Kansas when that tribunal was called upon to determine the validity of an act of the Kansas Legislature very similar to the Connecticut law considered in the Geer case. It forbade the transportation to other states of prairie chickens caught or killed in Kansas. The Supreme Court of that state held that this prohibition was unconstitutional, because "no state could pass a law which would directly interfere with the transportation therefrom to another state of anything which is or may be a subject of interstate commerce." A law which prohibited the killing or catching of prairie chickens might be valid, the court declared, although the indirect effect of such a law would be to prevent the export of prairie chickens to other states; but a law which allowed these birds to be killed, and thus to become subjects of traffic and commerce, and at the same time directly forbade their transportation to any other part of the Union, was pronounced void under the Federal Constitution.

It is not strange that the Justices of the Supreme Court did not agree. The result, which sustains the right of a state to prevent the exportation of game, will greatly facilitate the preservation of game in the several states; but we must say that the proposition that game is not an article of commerce within the meaning of the Constitution seems to us very doubtful as matter of law. How would it be in regard to oysters? A state can prohibit the taking of oysters from its public waters, but if it allows them to be taken, can it prevent them from being shipped to Chicago or Europe?

The Boers and the Railroads.

Mr. Chamberlain, in his despatch to President Krüger, devoted a short paragraph to railway matters. The railways have always been a sore point in the Transvaal. First there were the wishes of the Uitlanders, which were habitually disregarded, for better means of communication and better relations all round; then there was the President's Delagoa Bay policy, which meant that all other systems were to be ignored; and finally there was the natural irritation which an exclusive policy was bound to cause at the Cape. Mr. Chamberlain, no doubt, had the facts before him, but he did not deem it necessary to say much. The following sentence is, however, of interest: "I cannot suppose that, looking to the large interest which the Government of the Republic has in the financial success of its railways, there can be any hesitation in redressing proved grievances, or in adopting measures for the improvement of the personnel or

the traffic, and other arrangements of the line." Since the crisis railway affairs in the Transvaal have been reduced to a state of dire confusion. For the first two weeks after the raid only one goods train a day was allowed to pass through to Johannesburg, and this was altogether insufficient for the requirements of the Rand. The condition of things has lately been somewhat improved. It is to be hoped that President Krüger may see his way to adopt a wiser commercial and railway policy in the future than in the past.—*Transport*.

Standardizing.

The following item, clipped from a Western paper, comes, as might be expected, from a representative of the Passenger Department, a department to which the reporter, starving for copy, seldom appeals in vain:

"When Mr. Ingalls started in with the reorganized Chesapeake & Ohio, he said it was a good thing to have a standard colored train, and he selected the orange, with maroon trimmings, for passenger trains. It seemed such a good thing that afterward he selected the orange for the freight trains, and, as the depots along the line needed freshening up, he decided the standard color should be applied to them, and you will see nothing but orange depots with the standard trimming all the way from Cincinnati to the sea. Water tanks are painted the standard color, the block signal towers are painted the standard color, and now the agent at Culloden, W. Va., who was unfortunate enough to lose a leg several years ago, has painted his wooden leg to C. & O. standard color, with maroon trimmings."

Railroad Work in British South Africa.

The annual report of the British South Africa Company describes at length the progress made with railways in the company's territory. Regarding the Bechuanaland line it says: The line to Mafeking was opened for traffic in October, 1894, and the net earnings for the 10 months to the end of July, 1895, have been equal to four per cent. per annum on the cost of this section. The distance from Mafeking, the present railway terminus to Bulawayo, will be under 500 miles, and the section from Mafeking to Bagerone, a distance of about 95 miles, is now in course of construction and will be opened about July. The cost, as per contract, is £2,575 per mile, including bridges. From Bagerone the line will be continued to Palapye, a further distance of about 175 miles. The survey for this is almost completed. The line will be eventually continued to Salisbury, via Bulawayo, connecting with the Beira line at Umtali. The company's territories will then be well served by railways. With regard to the Beira Railway, which has been carried to Chimoio, the report says: A new railway company called the Beira Junction Railway Company, Limited, has been formed with the object of constructing a railway, 36 miles in length, connecting Port Beira with Fontesville, the present terminus of the Beira Railway. When this line and the extension to Salisbury are completed, the capital of Rhodesia will be in direct railway communication with the sea coast at Beira. The company's engineers report that, although construction has been somewhat delayed owing to the scarcity of labor, fair progress has been made, and it is expected that the line will be completed and opened for traffic within a few months. All permanent way and other materials required from this country have been delivered at Beira, and, up to the end of December last, about 20 miles of the earthworks and 23 bridges and culverts had been completed, and the rails laid for a distance of 7½ miles. A deep-water pier is to be erected at Beira, as the southern terminus of the railway. The materials for this work have been shipped, and as soon as these are received at Beira the pier will be commenced. The total length of telegraphic line under the control of the company south of the Zambesi now in operation is 1334 miles. For the six months ending Sept. 30, 1895, the receipts showed an approximate total of £7,631, and the expenditure £3,389.—*Engineering*.

The Traffic of the Suez and "Soo" Canals.

The Suez Canal passed in 1895 3,434 steamers, which is not quite 10 a day. The St. Mary's Canal, open last year 231 days, passed 12,495 steamers, 4,790 sail vessels and 671 unregistered craft. The average number of vessels that passed through the canal on each day that it was open was over 72, and the average lockages per day was a fraction over 30. The vessels that passed through the Suez Canal were larger than most of those which passed through the "Soo" Canal. But there are now in service on the Great Lakes several steamers which would find few superiors were they transferred to the ocean. The tendency is steadily to increase the size of these vessels. The average tonnage of steam vessels built on the Atlantic and Gulf coasts in 1894 was 268, while the average tonnage of steam vessels built on the Northern Lakes was 491. Several steamers larger than any previously built on the lakes were launched in 1895, and this year there has been launched at Cleveland a steamer which on a draft of 18 ft. will carry 6,700 tons of ore or 200,000 bushels of wheat.

The 16,733 vessels of every class that passed through the "Soo" Canal last year had a registered net tonnage of 16,089,778, which is an average of not much less than 1,000 tons, and the freight carried amounted to 14,471,648 net tons. The number of vessels that passed through the Suez Canal in 1894 was only \$2 less than the number in 1895, and the net tonnage was 8,033,105. The tonnage in 1895, then, very slightly exceeded one-half the tonnage of the "Soo" Canal, carrying almost entirely coarse bulk freights, and open less than eight months. Two and a half million tons of coal, nearly nine million barrels of flour, over 41 million bushels of wheat and other grains, nearly eight million tons of iron ore, and three-quarters of a million thousand feet of lumber, board measure, were the larger items of freight. The canal passed 16 per cent. more vessels than the year before, made 9 per cent. more lockages, and recorded 23 per cent. increase over the year before in registered tonnage and 10 per cent. increase in the amount of freight carried. On a single day, July 17, the lock passed 119 vessels. Besides the American canal there is the Canadian canal completed last year and open for 87 days. This canal passed 1,163 vessels, carrying 500,932 tons of freight, and having a net registered capacity of 717,003 tons. Putting the two canals together, the tonnage of vessels passing through the St. Mary's River and its canals is fully double the tonnage of vessels passing through the Suez Canal, and the number of passing vessels is more than four times as great.—*Journal of Commerce* (New York).

LOCOMOTIVE BUILDING.

The Lima Northern road in Ohio will shortly order about 12 engines.

The Canadian Pacific is reported to have issued specifications recently for building a number of new engines. The order will not be a large one.

The Seaboard Air Line will purchase 15 new freight locomotives for the divisions in Virginia and the Carolinas. Specifications have been prepared, but no contracts have yet been made. They are to be unusually heavy engines.

CAR BUILDING.

The Philadelphia & Reading road was to give out orders for building 1,000 coal cars on Wednesday of this week. The names of the successful bidders have not yet been announced.

The Pennsylvania is building a number of new postal cars at its Meadow shops. Two such cars have just been completed for the Pittsburgh, Cincinnati, Chicago & St. Louis. Besides the work on these new cars these shops are making general repairs on a number of the old postal cars.

The Seaboard Air Line will build 300 box cars immediately. Half of these cars will be built at the company's shops at Portsmouth, Va., and the remaining 150 will be contracted for with outside shops. It is reported that later on in the year a further order for perhaps 1,000 cars will be given out by the company.

BRIDGE BUILDING.

Albany, N. Y.—The Hudson Highland Bridge & Railway Company, a reorganization of the Hudson Suspension Bridge & New England Railway Company, has filed articles of incorporation with the Secretary of State. The company's capital is placed at \$84,900, and the Directors are John N. Hazard, Edward W. Serel and Robert Serel, of New York City; Henry Martin, William G. Lord and William James Pierce, of Brooklyn, and William D. Snow, of New Milford, N. J. The old company secured a charter from the Legislature in 1868 for the purpose of constructing a suspension bridge over the Hudson River, at a place between Verplanck's Point and Buttermilk Falls.

Gov. Morton has signed the bill extending from 1897 to 1907 the time for completing the New York and New Jersey Bridge.

Baltimore, Md.—A petition has been presented to the County Commissioners asking for the erection of a bridge over the Gunpowder Falls, near Donaldson's Mill, on the road running from the Hereford road to Parkton, in the seventh district.

The Columbia & Maryland (electric) Railway from Baltimore to Washington, crosses Gwynns Falls on the line of Edmondson avenue. The present wood and iron structure will be replaced by a steel bridge, the contract for which will soon be let.

Boston, Mass.—The town of Brookline objects to paying any portion of the expense of constructing the proposed bridge across the Charles River between Pleasant and Magazine streets. This not through any opposition to the bridge, but is the result of a previous agreement regarding expenses for bridges, etc., made at the time that Brookline released claim to a portion of territory along the Charles River, now a part of Brighton.

Carbondale, Pa.—The city has decided to build three concrete arch bridges this spring, and the contracts have been let to Clark & Co. for \$20,000.

Cleveland, O.—A steel viaduct across the river from Ontario street to Lorain street, between the Superior street and Central viaducts is proposed. The cost is estimated at about \$500,000.

Colorado Springs, Col.—Bridges at Bijou street and at Bolder street have been voted by the City Council. H. I. Reid is City Engineer.

Columbia, S. C.—Owing to a recent wreck on the Spartanburg, Union & Columbia (South Carolina) branch of the Southern Railway, two spans of one of the bridges between Spartanburg and this place were badly damaged. It is reported that the bridge will have to be practically rebuilt.

Conneautville, Pa.—Burgess Smith in his annual message calls attention to the poor condition of the bridges between the borough and township, the Mulberry street bridge, the Centre street bridge over the canal, and the Butt's Mill Bridge. The county will replace the Centre street bridge with an iron structure 80 ft. long, with 16-ft. roadway.

Dillsburg, Pa.—The York County Commissioners will build a 60-ft. bridge over Trimmer's run, on the road from East Berlin to Harrisburg.

Durham, N. C.—The County Commissioners of this county will, at their next meeting, the first Monday in April, let the contracts for building several bridges across streams in the county. The Chairman of the board, Durham, N. C., will give information.

Easton, Pa.—The plans and specifications for the new bridge at Tatamy, as presented by Prof. J. M. Porter, have been adopted by the County Commissioners. Bids will be asked for at once.

Professor Porter has been instructed to draw up plans and specifications for the overhead bridge at Freemansburg.

Freeport, Pa.—Nelson & Buchanan, of Chambersburg, Pa., have secured the contract for the 900-ft. wagon bridge across the Allegheny River between Armstrong and Westmoreland counties. Their bid was \$78,000. The bridge will be in three spans, with a 30-ft. roadway.

Galeton, Pa.—A new bridge will be built at this point, the cost, \$2,000, being raised by subscriptions.

Honesdale, Pa.—Last week's court appointed viewers on new bridge sites in Damascus, Mt. Pleasant and Texas townships. A stone arch bridge was recommended for Scott township.

Houston, Tex.—Bids will be received until April 7 for an iron bridge over Clear Creek. Address W. B. Westerlage, Commissioner, Galveston County, Galveston.

Lewiston, Me.—At a mass meeting of the citizens of this place on March 3 it was voted to build an iron bridge at Main street and a wooden one at Broad street to take the place of those recently washed away.

Lincoln, Neb.—Bids will be received until March 24 for bridges which will be needed throughout the county during the year. A. M. Timble is County Clerk.

Lockport, N. Y.—The Pine street bridge at this place, as we have before reported, will interfere with the working of the proposed steel lift lock which is to supersede the present locks. The state will be asked for an appropriation for a new bridge.

Minneapolis, Minn.—The Hastings & Dakota Railroad Co. is making arrangements with the city which will probably result in a bridge across their tracks at Hennepin avenue.

Montreal, Que.—Contracts for building a steel bridge at Holbrooks, Huntingdon, have been let. Joseph Talon is to build the abutments at a contract price of \$1,000, and the Imperial Bridge Co. is to build the superstructure.

Newburyport, Mass.—The Newburyport bridge, which has been damaged by the freshet, will be condemned, and the Commissioners will bear two-thirds the expense of a new structure.

New Haven, Conn.—The plans for the proposed drawbridge across the Quinnipiac River, at Grand avenue, have been completed by City Engineer Kelly. The estimated cost of the bridge is \$130,000.

Newton, N. C.—The County Commissioners of Catawba County have appointed a committee to prepare plans and receive bids for a bridge at this place. Bids will be received during the present month.

New York City.—S. V. R. Cruger, Park Commissioner, will receive bids until March 16 for replacing the Gapstow bridge in Central Park by a new stone and brick arch.

Painesville, O.—An iron bridge 400 ft. long will probably soon be built across the Grand River at the foot of Main street, this place. Address John E. Post, County Commissioner, as above.

Pittsburgh, Pa.—Bids will soon be advertised for, for a new double arched stone bridge entering Schenley Park from Forbes street.

Pottsville, Pa.—The grand jury has confirmed the report of viewers, recommending the erection of a county bridge in Mahanoy township.

Philadelphia, Pa.—The general officers of the Pennsylvania Railroad Company, accompanied by a number of guests, paid a visit of inspection to the new bridge over the Delaware River at Bridesburgh, above this city, on March 9, and the first trip of a train over the completed structure was made. This trip is not the formal opening of the bridge, since litigation has delayed the construction of approaches on the New Jersey side. The bridge was described in the *Railroad Gazette* for April 5, 1895.

Quebec, Que.—The North Shore Turnpike Trust Company has awarded a contract for a bridge to replace that known as Scott's Bridge, at Little River, to B. Lecierc of this city, and A. Rousseau, of Montreal. It is to be of iron, 170 ft. long, and will cost \$8,000.

Richmond, Ind.—The Board of Park Commissioners has decided to erect two small iron bridges in the City Park. H. L. Weber is City Engineer.

Sedalia, Mo.—A viaduct about 100 ft. long is proposed at this place to cross the tracks of the Missouri Pacific. R. Morey, City Engineer, may give information.

Stockton, Cal.—The 510-ft. bridge of the San Francisco & San Joaquin Valley Railroad over the Stanislaus River has been completed and put into use.

Syracuse, N. Y.—It is reported that the plans for the West Genesee street bridge will be in such condition in three weeks that bids may be advertised for. Address George W. Aldridge, State Superintendent of Public Works, Albany, N. Y.

Tarboro, N. C.—Edgecomb County has decided to construct an iron and steel bridge, 580 ft. long, across the Tar River, after plans and specifications now ready. A committee has been appointed to receive bids. Address the County Commissioners.

Upper Marlborough, Md.—It is reported that a bridge will be built on the Selby's road near this place. John S. Rawlins is County Commissioner.

Washington, D. C.—Plans have been submitted for the proposed Anacostia drawbridge across the Eastern Branch of the Potomac, at First street. Its estimated cost is \$779,130. The proposed opening of the draw is 150 ft. wide, but objections have been made to placing any bridge across the river at a point below the Navy Yard.

The War Department has reported favorably upon the bill for a bridge over the Mississippi River at Aitkin.

Williamsport, Pa.—The Grand Jury has recommended that two bridges be built across Antes Creek, in Limestone Township.

RAILROAD LAW—NOTES OF DECISIONS.

CARRIAGE OF GOODS AND INJURIES TO PROPERTY.

In Texas a shipper of corn, who, knowing that the one to whom he consigned it could not pay for it, and knowing also that he himself was expected to pay for the use of the car while the corn was in it, allowed it to remain on the tracks until he sold it to another party, is liable for the use of the car.¹

In Texas a railroad is not bound to construct its road according to the plan which will the least inconvenience or injure the remaining land of the person from whom the right of way was obtained, but may construct it on plans of its own selection, so long as they are suitable and skillfully executed, and do not exceed the damages assessed in condemnation proceedings or embraced in a grant by the deed.²

In Texas, where two trains on different lines collide through the negligence of one only, the other company may recover from the one in fault a *lai* damages which it was compelled to pay on account of freight injured by the collision.³

In the same state a railroad company received, and issued bills of lading for, uncompressed cotton, and, in accordance with written authority, sent it to be compressed. After having remained an unreasonable length of time with the compress company, it was destroyed by fire. The bill of lading provided that the railroad company should not be liable for loss by fire, except in case of its negligence. The Supreme Court holds that the company was liable for the loss of the cotton.⁴

In Kansas a railroad taking loaded cars from its connection with another road, transferring them by a switch engine over its own track to a spur of its own, and receiving its compensation from the connecting road, is liable as a common carrier for the safety of the goods transferred.⁵

In Texas a railroad agreeing to transport cattle on a certain day is liable for loss by shrinkage resulting from its failure to provide sufficient stock pens for loading

the cattle within a reasonable time after they were at the place of shipment.⁶

INJURIES TO PASSENGERS, EMPLOYEES AND STRANGERS.

In Kansas one who remained on a train a half hour after reaching his destination, it being the terminus of the road, was not, after that time, a passenger.⁷

In New York it is not negligence, *per se*, for a passenger on a motor car to stand on the front platform, holding on with both hands to the iron rod behind him, while the car is going rapidly over a road with curves in it, he having been directed by the conductor to stand there while smoking.⁸

In Kansas a passenger's slight inattention to duty, which is not the proximate cause of the injury, does not bar a recovery for an injury resulting from negligence of the company.⁹

In Maryland, where one gets off a train at a station and starts to go to the ticket office, taking the usual and only course thereto across an intervening track, he is not, on reaching it, bound to "stop, look and listen."¹⁰

In Indiana, in the absence of any knowledge or information putting him on inquiry, an employee has the right to presume that a fellow employee is competent to perform the services for which he is employed.

In Missouri a railroad owned an open elevated track, upon which cars were run for the purpose of transferring grain to other cars on the track below, such work being done in the daytime by an independent contractor, and it was the custom for defendant's trainmen to remove at night the cars so unloaded. Plaintiff, a foreman of defendant, while engaged with a crew in removing such cars, stepped on a grain door lying on a walk beside the track, and was injured. Other crews were employed in doing the same kind of work, and other railroads had tracks adjoining defendant's. No one had ever seen a grain door on the way before. This one had no mark on it, and it was not shown how it came there. The Supreme Court rules that an instruction that the jury might find that the door was placed on the way by the contractor or his employer was error.¹¹

In West Virginia it is said that a minor employed as a railroad hand has a right to rely on the superior skill and knowledge of his foreman in ordering a hand car on which both were riding to be propelled around a curve without ascertaining if a train was coming, as required by the rules of the company, and cannot be charged with contributory negligence in case of death by collision on the curve.¹²

In Kentucky a railroad is bound by the action of the conductor of a train in employing one to couple the cars thereof, during which operation such person is injured.¹³

In Iowa a finding that deceased, a section hand in the employ of a railroad, was rightfully on the track when killed, is not supported by evidence that his day's work was done, and he was going home, merely because his foreman had told him any time he was going over the road to notice the track closely, and if anything was found wrong to let him know.¹⁴

The Court of Appeals of Texas lays it down that where the dangers consequent upon negligence of an employer in having work done in an unusual and dangerous manner are apparent to a person of ordinary intelligence, an employee engaging voluntarily in the work assumes the risk of injury from these causes.¹⁵

In Texas plaintiff alleged that he was ordered by his foreman to sit in the rear of a hand car under the brake handles; that the car was being run very rapidly; that plaintiff was ordered to rise and take hold of the brake handles while they were moving; that it was impossible for him to do so without being struck by the handles; and that plaintiff did not know the danger of obeying such orders, but the foreman did. Plaintiff was struck by the moving brake handles. The Court of Appeals hold that the facts alleged do not constitute a cause of action, as, the danger being apparent, plaintiff executed the orders at his own risk.¹⁶

In Iowa it is held that where the engineer of a train saw children ahead, in a dangerous position, on a bridge having two tracks, knew that another train was close behind on the other track, and that the place to stand on the bridge between the two tracks was less than three feet, having a plank walk one foot wide, the jury is justified in finding him negligent for not stopping his train when he could have done so, although he thought the children would go on the plank walk.¹⁷

In the same state it is said that persons in charge of a train owe no duty to an employee of the road walking along the track while off duty, till he is discovered.¹⁸

¹ Hunt v. M. K. & T., 31 S. W. Rep., 523.
² G. C. & S. F. v. Richards, 32 S. W. Rep., 96.
³ H. & T. C. v. Williams, 31 S. W. Rep., 556.
⁴ M. K. & T. v. McFadden, 32 S. W. Rep., 18.
⁵ M. P. v. Wichita W. G. Co., 40 Pac. Rep., 899.
⁶ M. K. & T. v. Woods, 31 S. W. Rep., 37.
⁷ C. K. & W. v. Frazer, 40 Pac. Rep., 923.
⁸ Francisco v. T. & L., 34 N. Y. S., 859.
⁹ A. T. & S. F. v. Hughes, 40 Pac. Rep., 919.
¹⁰ B. & O. v. State, 32 Atl. Rep., 201.
¹¹ C. & I. v. Batty, 40 N. E. Rep., 753.
¹² Burns v. K. City, Ft. S. & M., 31 S. W. Rep., 347.
¹³ Turner v. N. & W., 22 S. E. Rep., 83.
¹⁴ N. N. & M. V. v. Carroll, 31 S. W. Rep., 132.
¹⁵ Baker v. C. R. I. & P., 63 N. W. Rep., 667.
¹⁶ Bonnet v. H. & S. A., 31 S. W. Rep., 525.
¹⁷ Jones v. H. & S. A., 31 S. W. Rep., 706.
¹⁸ Sutzin v. C. M. & St. P., 63 N. W. Rep., 769.
¹⁹ Baker v. C. R. I. & P., 63 N. W. Rep., 667.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Chicago Junction & Union Stock Yards, quarterly, 1 1/2 per cent. on the preferred stock, payable April 1.

Chicago & Northwestern, quarterly, 1 1/2 per cent. on the preferred stock, payable April 2.

Cleveland, Cincinnati, Chicago & St. Louis, quarterly, 1 1/2 per cent. on the preferred stock, payable April 1.

Keokuk & Western, semi-annual, 1 per cent. payable April 1.

Manhattan, quarterly, 1 1/2 per cent., payable April 1.

New York & Harlem, 3 per cent., payable April 1.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Canadian Pacific, annual, company's office, Montreal, Canada, April 1.

Chicago & Alton, annual, company's office, Chicago, April 6.

Joliet & Chicago, annual, company's office, Chicago, April 6.

New York Central & Hudson River, annual, April 15.

Oregon Short Line & Utah Northern, annual, Hooper Building, Salt Lake City, Utah, March 18.

Pennsylvania, annual, election will be held at the Broad Street station, March 24.

Texas & Pacific, annual, company's office, 195 Broadway, New York, March 18.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Roadmasters' Association of America* will hold its next annual convention at Niagara Falls, beginning on Sept. 8.

The *Railway Signalling Club* will meet on the second Tuesday of the months of January, March, May, September and November, in Chicago. Mr. George M. Basford, is secretary, The Rookery, Chicago.

The *Western Railway Club* meets in Chicago on the third Tuesday of each month at 2 p. m.

The *New York Railroad Club* meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The *New England Railroad Club* meets at Westervale Hall, Bromfield street, Boston, Mass., on the second Tuesday of each month.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.

The *Southern and Southwestern Railway Club* meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The *Northwestern Railroad Club* meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month, at 8 p. m.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month, at 8 p. m.

The *Western Society of Engineers* meets on the first Tuesday in each month, at 8 p. m. The headquarters of the society are at 1736-1739 Monadnock Block, Chicago. The business meetings are held on the first Wednesday at its rooms. The meetings for the reading and discussion of papers are held on the third Wednesday at the Armour Institute, Thirty-third street and Armour avenue.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The *Boston Society of Civil Engineers* meets at Westervale Hall, 36 Bromfield street, Boston, on the third Wednesday in each month, at 7:30 p. m.

The *Engineers' Club of St. Louis* meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

The *Engineering Association of the South* meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville, Tenn.

The *Engineers' Society of Western Pennsylvania* meets in the Carnegie Library Building, Allegheny, Pa., on the third Tuesday in each month, at 7:30 p. m.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Association of Engineers of Virginia* holds informal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at 8 p. m.

The *Denver Society of Civil Engineers* meets at 36 Jacobson Bock, Denver, Col., on the second Tuesday of each month except during July and August.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7:30 p. m.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Engineers' Club of Cincinnati* meets at the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati, O., on the third Thursday in each month, at 7:30 p. m. Address P. O. Box 333.

The *Engineers' and Architects' Club of Louisville* meets in the Norton Building, Fourth avenue and Jefferson street, on the second Thursday each month at 8 p. m.

The *Western Foundrymen's Association* meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. S. T. Johnston, Monadnock Block, Chicago, is secretary of the association.

The *Engineers' Club of Columbus, O.*, meets at 12 1/2 North High street, on the first and third Saturdays from September to June.

The *Engineers' and Architects' Association of Southern California* meets each third Wednesday of the month in the Hall of the Chamber of Commerce, Los Angeles, Cal.

The *Engineers' Society of Western New York* holds regular meetings the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.

The *Civil Engineers' Society of St. Paul* meets on the first Monday of each month, except June, July, August and September.

The *Engineers' Society of Western New York* meets on the first Monday of each month at the Society's rooms in the Buffalo Library.

ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.

The eighth annual meeting of the above association will be held at New York City, commencing Wednesday, May 27th, 1896, at 10 o'clock a. m.

NAVAL ARCHITECTS AND MARINE ENGINEERS.

On account of a change in duty, which makes his continuance in office no longer practicable, Mr. Capps has been compelled to resign the office of Secretary and Treasurer of the Society of Naval Architects and Marine Engineers. The Executive Committee has elected Mr. Francis T. Bowles Secretary and Treasurer, vice Capps. resigned, and all future communications intended for the Secretary-Treasurer of the Society should be sent to the following address: Francis T. Bowles, Esq., Secretary-Treasurer S. N. A. & M. E., 12 West Thirty-first street, New York, N. Y.

CIVIL ENGINEERS' SOCIETY OF ST. PAUL.

A regular meeting of the Society was held on March 2. President Stevens presided, and 13 members and visitors were present.

Resolutions were passed requesting that the bill recently introduced in Congress by Mr. J. F. Aldrich, and providing for a Commission of Public Architecture to consist of three architects and two officers of the United States Army, should be amended to provide for at least one civilian civil engineer as a member of said commission. This action was taken because of the fact that

many of the problems in modern building call for engineering skill of the highest grade.

Mr. K. E. Hilgard presented some notes on the use of structural steel in railroad rolling stock, having been employed for some months in applying the principles of bridge engineering to the car trucks of the N. P. R. R. system, with intent to reduce weight, increase strength, simplify parts and debar cast iron and wood. His paper was fully illustrated by detail drawings.

British Iron and Steel Institute.

The autumn meeting of the Iron and Steel Institute will be held at Bilbao at the beginning of September. The programme will include visits to the leading iron and steel works, and to the important mines from which so large a proportion of the iron ore used in Great Britain is obtained. In view of the limited hotel accommodation at Bilbao, arrangements are being made to secure one of the Orient Company's steamers to convey the members to Bilbao and back, and to serve as a floating hotel. An experienced surgeon is carried, also musicians, stewards, etc., and an ample staff of stewards. The routine of meals will be maintained in port, and communication with the shore will be provided without extra charge. The cruise will last a fortnight, and calls will be made at some of the Spanish and French watering places. The passage money will be about 20 guineas, including board on the steamer while in port. The size of the steamer to be detailed for this service will depend on the number of members likely to avail themselves of the invitation to visit Spain. The meeting will be held some time in September. The annual general meeting of the institute will be held at the Institution of Civil Engineers, on May 7 and 8 next.

Engineers' Club of St. Louis.

The club met Feb. 19 with President Ockerson in the chair, sixteen members and three visitors present.

Prof. J. H. Kinealy addressed the club on the subject of testing pressure gages to high pressures, explaining in detail the investigations and experiments which he had recently conducted. The pressures were beyond the reach of the ordinary mercury column and special apparatus was therefore necessary. The plan which he had developed consisted in measuring the reduction in volume of an air column which was maintained at constant temperature. The volume decreased exactly as the pressures increased. He had in this way measured pressures up to 675 lbs. per square inch.

Messrs. Barth, Freeman, Flad, Ockerson, Crosby, Harrington and Prindle took part in the discussion.

It was thought that the increase of temperature due to compressing the air, the possible absorption of air by the water and the possible expansion of the tube itself under the increase of pressure might introduce errors. Prof. Kinealy thought, however, that they were not sufficiently large to vitiate the results.

Mr. Barth showed the club some curious pieces of steam engine piston packing rings which had evidently gone through a severe experience.

Engineers' Club of Philadelphia.

A regular meeting of the Club was held on Saturday, March 7, at 8 o'clock p. m. A paper was read on "Suburban Sewage Question and the Description of Sewage Disposal Works at Wayne," by Mr. Thomas G. Janvier. It was illustrated by lantern slides. An exhibition of lantern slides illustrating the construction work on the Croton Aqueduct and also ancient methods of plumbing was made by Dr. Henry Leffmann.

At the meeting of Feb. 15, 87 members and visitors were present. Mr. Thomas H. Mirkil, Jr., read the first paper of the evening, describing the Pumping Engines for the Queen Lane Division of Philadelphia's water supply system. We take the following from it:

THE QUEEN LANE DIVISION OF THE PHILADELPHIA WATER SUPPLY SYSTEM.

There are four of these engines, each having 20,000,000 gal. capacity in 24 hours. They are of the vertical, triple expansion type, with single-acting plungers, and were designed and built by the Southwark Foundry and Machine Co. of Philadelphia. The contract for the first engine was placed in December, 1893, and for the others in March, 1894. The entire work is now about completed, two of the pumps having been running for several months past on regular work.

They are designed to work under an initial steam pressure of 140 lbs. and to pump through a rising main of 48 in. in diameter and about 8,000 ft. long into a reservoir at a height which will give a static head of about 250 ft., equal to a pressure, allowing for friction, of about 110 lbs.

The high pressure cylinder is 37 in. in diameter, intermediate cylinder 62 in. in diameter, low pressure cylinder 96 in. in diameter. There are three single acting plungers each 34 1/2 in. in diameter, all of 54-in. stroke. The steam inlet to each high pressure cylinder is 8 in. in diameter, and the suction and discharge pipes are each 40 in. in diameter at the pump, enlarging to 48 in. a few feet away. There is a 48-in. check valve placed in each discharge pipe, and the suction pipes are provided with foot valves. The length of suction pipes is about 300 ft. The height of suction lift at ordinary stage of water in the river is about 17 ft. Each pump chamber contains 90 suction and 90 discharge valves, with a net area of 9 sq. in. through each valve. The area of the plunger is 934 sq. in., and the area through the valves 810 sq. in.

When the pump is running 22 1/2 revolutions per minute, which is the required speed to deliver 20,000,000 gals. of water in 24 hours, with an allowance of about 3 per cent. for slip, the speed of the water through the valves is 3.6 ft. per second.

Each pump is provided with two fly-wheels, 18 ft. in diameter and weighing 40,000 lbs. each. The air pump, which is single acting and has a diameter of 28 in. and a stroke of 36 in., is driven through a beam from the low pressure plunger crosshead.

The total weight of each engine proper is something over 1,000,000 lbs., and the total weight of the four pumps, including the piping within the house and the steel substructure upon which they rest, is about 5,000,000 lbs. or 2,500 tons. The total height from the concrete foundation to the highest point of steam end is, in round numbers, 56 ft., and the extreme length and width occupied by each pump is 46 ft. x 18 ft., respectively.

A noteworthy feature of this pumping plant is the substitution of steel structural work in place of the usual cumbersome and expensive masonry work for the support of the engines.

The duty guaranteed is 110,000,000 foot-pounds during a run of 30 consecutive days with regular employees of the Bureau of Water and using coal of fair quality.

THE ENGINE AND BOILER HOUSE.

The second paper of the evening, describing the engine and boiler-house of the same plant, was read by Mr. F. L. Hand. He prefaced his paper by explaining that this pumping plant had been constructed to supply all that section of the city lying north of Vine and west of Broad streets, which now receives water by direct pumping from the Schuylkill River.

The engine-house is 136 ft. long by 81 ft. wide, one story high, with a height of 48 ft. from floor to roof plates. The basement is 21 ft. in the clear. The walls are faced internally and externally with buff bricks, the inside being glazed for a space of 6 ft. from the floor.

The boiler-house is 180 ft. long, by 81 ft. wide, and is also in one story, brick faced, similar to the engine-house, with a height of 36 ft. from floor to roof plates. It has a basement 17 x 75 ft. in each end, that in the south end being used as a machine shop, while that in the north end contains the two hydraulic lifts and opens into the mouth of the tunnel to the proposed coal shed, east of Ridge avenue.

There is provision in the engine-house, at a height of 42 ft. from the floor, for an electric traveling crane, with a clear span of 75 ft. It has a lifting capacity of 20 tons, and has assisted materially in facilitating the work of erecting the engines.

The stack is built central to the front wall of the boiler-house, but separated from it by a space of 9 ft. The inside diameter of the barrel is 12 ft., and it rises to a height of 201 ft. above the ground in front of the building.

DISCUSSION.

Mr. JAMES CHRISTIE: There has been a marked improvement in the economy of pumping engines during late years, due to the use of high pressure steam and multiple expansion. A duty of 140,000,000 foot-pounds per 100 lbs. of fuel consumed, is reported in several instances, and by the use of controlled water valve gear, and a piston speed of 400 ft. per minute, it is probable that a duty of 150,000,000 is feasible. It will be remembered that 30 years ago a duty of 100,000,000 was obtained only on a few Cornish engines under exceptional conditions. It is probable that the best pumping engines throughout the country at that time did not yield an average duty of 50,000,000 foot-pounds.

COST OF POWER.

Mr. Codman explained that the cost of power to the Bureau of Water during 1895 should have been stated at the last meeting as 10 cents per horse-power day, which was obtained by dividing the cost of the coal consumed during the year by the horse-power required for the amount of work that was done.

PERSONAL.

Mr. H. W. Jackson, Commercial Agent of the Chicago, Rock Island & Pacific, at Pueblo, Col., has been transferred to Chicago with the title of District Freight Agent in Illinois.

Mr. William F. Snyder, General Western Passenger Agent of the "Big Four," with headquarters in St. Louis since 1887, has resigned, taking effect April 1, to engage in commercial business.

Mr. L. A. Burek has resigned as Secretary and Treasurer of the Baltimore & Annapolis Short Line Railroad, and Mr. C. A. Coombs has been elected to the positions in addition to his duties as General Manager.

Mr. Warren J. Lynch, Chief Clerk of the "Big Four" passenger department in Cincinnati, has been appointed Assistant General Passenger Agent, with headquarters in St. Louis. The office of General Western Passenger Agent has been abolished.

Mr. C. B. Hart, several years a traveling freight agent for Chicago, Rock Island & Pacific, with headquarters at Beatrice, Neb., has resigned, and will become General Manager of the Hutchison & Southern, a line of 80 miles in Southern Kansas.

Hon. Charles H. Gibson, at present United States Senator for Maryland, has recently been elected President of the Virginia, Fredericksburg & Western road, a new company, which proposes to build south of Fredericksburg in Virginia to a point on Chesapeake Bay.

Mr. P. W. Cole, heretofore Commercial Agent of the Wabash in St. Louis, has been appointed Assistant General Freight Agent of the road, with headquarters in St. Louis, vice Mr. John D. Lund, transferred to Kansas City as representative of the road in Missouri river territory.

Mr. P. W. Coyle, lately Commercial Agent of the Wabash in St. Louis, has been appointed Assistant General Freight Agent of the road, with headquarters in that city, vice Mr. John D. Lund, transferred to Kansas City as Representative of the road in Missouri river territory.

Mr. L. M. Foutz, General Agent of the Passenger Department of the Erie Railroad, located at Cleveland, O., died at his home in that city last week. He had been with the Erie lines for many years and was in railroad service altogether over 30 years. In 1890 he was promoted to the position which he held at the time of his death.

Mr. W. H. Woodin has recently been elected Vice-President of the Jackson & Woodin Manufacturing Co., of Berwick, Pa. This is the office formerly held by Mr. Frederick H. Eaton, who was elected President of the company a few weeks ago on the resignation of Mr. Zehnder. Mr. H. F. Glenn continues as General Manager of the company and Mr. W. F. Lowry as Secretary and Treasurer.

Mr. Martin Van Brocklin, a nephew of the late Peter Cooper, and an engineer of experience, died in North Platte, Neb., last Monday. He had charge of the erection of the part of the Sixth avenue elevated in New York City built by the Edge Moor Bridge Works, and was afterward made Superintendent of that road. He was also one of the engineers of the Oroya Railroad in Peru, and had charge for some time of the erection of Hawkesbury River bridge in Australia.

Mr. Frank E. Kinsman, Mem. A. I. E. E., formerly President and Engineer for the Kinsman Block System Company, has opened an office at 66 Broadway, New York City, as Consulting and Electrical Engineer. Mr. Kinsman has had a long and extensive experience, having been closely identified with electrical interests since 1876. For some time past he has given much attention to the application of electricity on railroads.

Mr. Barrett B. Mitchell has been promoted from the position of General Freight Agent of the Michigan Central road to that of General Freight Traffic Manager. This is a new office on the Michigan Central. Mr. Mitchell was formerly General Manager of the Canada Southern and Blue Line fast freight lines, resigning just a year ago to go the Michigan Central. He had been General Manager of the freight lines since 1878, having risen to that office in 10 years' service from a clerkship.

Mr. Frank Harriott, who has been General Freight Traffic Manager of the Baltimore & Ohio for a number of years, has resigned that position to accept a similar position with the Erie Railroad. It is reported that he will receive a salary of \$15,000 a year. Mr. Harriott was

born in New York in 1842, and entered the railroad service in 1872 as Contracting Agent for the Baltimore & Ohio. He became General Freight Agent of the company in 1881, and in 1888 was advanced to the position he has just resigned.

Mr. J. N. Johnson is the new Traffic Manager of the Chicago, Rock Island & Pacific, his appointment having been announced last week. He succeeds the late Mr. William M. Sage. Mr. Johnson has been General Freight Agent of the eastern lines of the Chicago, Rock Island & Pacific for the last eight years. He went to the company in 1884 as Assistant General Freight Agent, having previously held the same position on the old "Big Four" road. His railroad experience, which began in 1870, has been entirely in the traffic department.

Mr. C. S. Smith, a civil engineer of Boston, recently passed through New Orleans on his way to San Francisco to start on a trip to Japan. Mr. Smith at New Orleans told the newspapers that the chief object of his visit was to study the railroads of Japan with a view to the extension of the present lines in that country. His report is to be made for influential and wealthy Japanese officials. He stated that it is proposed to organize one or more Japanese companies to finance and construct such new railroads as may be undertaken.

Mr. C. S. Wight has been appointed to the new office of Manager of Freight Traffic of the Baltimore & Ohio. Mr. Frank Harriott, who has been fulfilling similar duties as General Freight Traffic Manager, has resigned from the service of the Baltimore & Ohio to go with the Erie road. He will end his connection with the Baltimore & Ohio on March 15, when Mr. Wight will take charge. Mr. Wight has been for some time General Freight Agent of the Pittsburgh & Trans-Omaha division of the Baltimore & Ohio, and has been in the employ of the company since 1880.

Mr. H. S. Morse, who died at Volusia, N. M., last week, was an old railroad officer. Since 1886 he had been engaged as a railroad contractor in various parts of the country. His first railroad work was on the old Williamsport & Elmira road, beginning in 1855. He was Superintendent of the Albany & Susquehanna about 1871; then Master of Transportation of the Chicago Division of the Baltimore & Ohio; later Superintendent of the Indianapolis & Decatur, and Superintendent of Construction of the Cincinnati, New Orleans & Texas Pacific in 1880. He held this office about three years, and then went to the Brunswick & Western in Georgia as General Manager.

Mr. Henry T. Gallup, who was for eight years General Superintendent of the Boston & Albany, died at Orr's Islands, Me., on Tuesday at the age of 60. Mr. Gallup was born in Connecticut, and began railroading on the Boston & Worcester as brakeman in 1855. He started, like so many other successful railroad officers, with no other qualification than a common school education, a bright mind and unlimited energy. He rose gradually to the position of passenger conductor, and in 1875 was made Freight Agent at East Boston, an important point where export freight is handled. In 1880 he was made Assistant General Freight Agent, and in 1884 General Freight Agent. While in the train service he industriously improved his time in study, and acquired what was practically a liberal education. He was appointed General Superintendent in 1886, and resigned in April, 1894, on account of failing health.

Mr. William M. Greene, the new General Manager of the Baltimore & Ohio, is now General Manager of the Cincinnati, Hamilton & Dayton, and has held that position for three years. He is about 38 years old, but has had a long railroad experience and filled a number of responsible positions. His father was some time General Manager and a leading director of the Columbus, Hocking Valley & Toledo road, of which the son became Vice-President and Treasurer. Mr. Greene was Assistant to President Ingalls of the Cleveland, Cincinnati, Chicago & St. Louis in 1887, and for several years was General Manager of that company. On leaving that company he took the presidency of the Griffin Wheel & Foundry Co., of Chicago, and remained at the head of that firm for about two years until he went to the Cincinnati, Hamilton & Dayton in August, 1893.

Mr. Don A. Sweet has just been appointed General Freight and Passenger Agent of the Atlantic & Pacific road. His headquarters will be at Albuquerque, N. Mex. Heretofore the traffic department of this road has been in charge of officers of the Atchison, Mr. J. J. Byrne, General Passenger Agent of the Southern California, at Los Angeles, having charge of the passenger matters and Mr. H. C. Bush, Assistant General Freight Agent of the Atchison, at San Francisco, having charge of freight matters as the company's General Freight Agent. Mr. Sweet was for many years with the Atchison road, being connected with its traffic department. Recently he has been Secretary for Commissioner Goddard of the Trunk Line Association in New York City. He was for a time Assistant to the General Manager of the Chesapeake & Ohio, and was also General Freight and Passenger Agent of the Quincy, Alton & St. Louis.

Mr. Robert B. Campbell, General Manager of the Baltimore & Ohio Railroad, resigned last week and has been succeeded by Mr. William M. Greene, of Cincinnati. Mr. Campbell went to the Baltimore & Ohio August, 1892, and became General Superintendent of the Trans-Omaha Division, succeeding Mr. Edward Dickinson, who had left to become Assistant General Manager of the Union Pacific. On Mr. J. T. Odell's resignation as General Manager of the Baltimore & Ohio in 1893 Mr. Campbell was transferred to Baltimore as his successor. Before going to the Baltimore & Ohio Mr. Campbell had been General Manager of the Jamaica road for about a year and before that had been Division Superintendent of the Central Pacific and the Chicago, Milwaukee & St. Paul, being on the latter road about 10 years. Mr. Campbell is one of the inventors of the Campbell-House combination stock, box and coal car, which has been illustrated in these columns.

Mr. George H. Burrows, for many years Superintendent of the Western Division of the New York Central road, died in Buffalo, March 9, aged 74 years. He had been seriously ill from a complication of diseases for two years. Mr. Burrows entered the railroad service in 1838 on the Connecticut River road and was with that company about 12 years. He was appointed Superintendent of Construction of the Rochester, Lockport & Niagara Falls road in 1853. Later he was made Superintendent of the Niagara Falls Division of the New York Central. From 1857 to 1865 he was General Superintendent of the Toledo, Wabash & Western; 1865 to 1869 Superintendent of Construction and Operation of the Saratoga & Hudson road and from 1869 to 1875 General Superintendent of the Wabash, Lafayette & Bloomington road. He was appointed Superintendent of the Western Division of the New York Central & Hudson River road in 1873, which position he held until his retirement from active service, a year ago.

—Mr. W. P. Appleyard is now in charge of the car department of all the lines of the New York, New Haven & Hartford as Master Car Builder. The car department was formerly in charge of a Superintendent of the Car Department, but that office was abolished last summer. Shortly after, Mr. Appleyard was transferred to New Haven, and since November last has been acting as Master Car Builder. He has had an extensive experience in car building and a previous training as an architect. Mr. Appleyard has been with the New York, New Haven & Hartford company about two and a half years, going to its Old Colony division in 1893 from the Pullman Car Co., having been with that company a number of years in various responsible positions. He was mechanical inspector for a time and then became superintendent of the repair shops at Pullman, Ill. He prepared and arranged the exhibit made by that company at the World's Fair, and took charge of the exhibit at the grounds. He resigned in July, 1893, after the exhibition opened, to go to the Old Colony at Boston, remaining there until his transfer to New Haven.

—Mr. William G. Wattson, Superintendent of the Hudson River Division of the West Shore Railroad, was shot by a discharged employee on March 5, and died from the effects of the wound on Tuesday morning, March 10. The assassin was Edmund Clifford, who had been employed by the railroad company as a detective for several years and was discharged recently because of his drinking habits; and it appears that he was under the influence of liquor when he killed Mr. Wattson. He came into the Superintendent's office to complain of his discharge, and the shooting occurred in the presence of Mr. Wattson's stenographer. After a very brief parley he drew a pistol and fired three times, the second proving fatal. Clifford gave himself up. Mr. Wattson was 42 years old. He was the son of a clergyman and was born in Prince George's County, Maryland. His early railroad service was as telegraph operator, station agent, train dispatcher, etc., on the Queen Anne & Kent County, the Huntingdon & Broad Top Mountain and the Allegheny Valley. He began on the West Shore in 1883, was for several years Car Accountant, and was promoted to the Superintendence in 1890.

Mr. Wattson was unusually prominent in railroad circles for so young a man. He took an active part in the work of the Car Accountants' Association, and being a man of business-like methods and precise habits of thought, readily assumed a leading position. He worked assiduously for reform in car-service methods, and after his promotion took a lively interest in all the current discussions looking to the improvement of the railroad service, and was a frequent contributor to the columns of the *Railroad Gazette*. He was a familiar figure in the American Railway Association, the American Society of Railroad Superintendents and the New York Railroad Club, of the latter of which he had been Secretary since the beginning of the current year. As a railroad officer he was energetic and industrious and always animated by a strong determination to do his best. His discipline was strict, but he was always considerate. He leaves a wife and three daughters.

—Dr. William Taussig, President of the Terminal Railroad Association, at St. Louis, resigned at the annual meeting last week. His resignation has been induced by ill health. Dr. Taussig became President of the Terminal Railroad Association at its organization about eight years ago, and he had been with its predecessors since 1867. In March of that year the Board of Directors of the Illinois & St. Louis Bridge Co. (now the St. Louis, or Eads, Bridge, the nucleus from which the present great Terminal system started) held its first meeting and elected Dr. Taussig as its Chairman of Executive Committee. In that capacity the whole arduous administrative work during the seven years of construction, and the financial management, fell to him. When it is remembered that the cost of the structure, as estimated by the engineers, was placed at \$4,500,000, and that the ultimate outlay was \$12,000,000, the task of raising the funds to complete it will be seen to have been no easy one. The bridge was opened for traffic in July, 1874, and in September of that year it went into the hands of Receivers. At the request of the London Committee of Bondholders who then came to St. Louis, Dr. Taussig continued to act as General Manager. The London Committee, after much delay, finally agreed upon a plan of reorganization which Dr. Taussig submitted, under which all the original full-paid stock (\$3,500,000) was completely wiped out, and Dr. Taussig together with all the directors and original subscribers lost his large investment. In 1878 the reorganized St. Louis Bridge Co. went into operation, and in 1882 it was leased by the Wabash and Missouri Pacific, both then in control of Mr. Jay Gould, Mr. Taussig continuing as General Manager. The ownership (or leasehold) by Mr. Gould, of the bridge, terminal and passenger station, called forth antagonism by the other railroads, and Dr. Taussig proposed to Mr. Gould the formation of an association, whose members would be the railroads using the bridge and the terminals. It required patience and tact to bring the various lines to an understanding, and to arrange a financial scheme, but finally, in 1889, the Terminal Railroad Association of St. Louis was formed, and Dr. Taussig was elected its President. The enlargement of the terminal facilities and the construction of the new station, he took in hand at once with the greatest energy. The success of this latter undertaking, which also involved the overcoming of great financial difficulties, the acquisition of several city blocks, covered by factories and houses, before anybody knew by whom or for what purpose they were bought, is well known, and the fine St. Louis station is a monument to the managing talent of its President. In the fall of 1893, Dr. Taussig resigned, to take effect the following January, but the Board refused to accept his resignation and prevailed on him to continue in the Presidency until the last election, when he positively declined a re-election and the Board passed some highly complimentary resolutions.

ELECTIONS AND APPOINTMENTS.

Chicago & Southeastern (Indiana).—H. Moore, General Manager, is now Purchasing Agent and Car Accountant, in addition to his other duties. E. D. Peterson, formerly Car Accountant and Purchasing Agent, has resigned.

Choctaw, Oklahoma & Gulf.—Henry Wood, formerly Acting Manager, has been appointed General Manager of the road, with headquarters at South McAlester, I. T. Mr. Wood was formerly on the South Jersey road, of which Mr. Gowen, the President of this company, is Receiver.

Duluth, Missabe & Northern.—J. W. Kreitter has been appointed Acting Superintendent of this road with headquarters at Duluth, Minn. Edward S. Kempton, who has been Acting Treasurer, has been elected Treas-

urer. The duties of Mr. D. M. Philbin, who recently resigned as General Manager, have been assumed by Mr. J. T. McBride, First Vice-President.

Duluth, Mississippi River & Northern.—F. E. Hixson has been appointed General Freight and Passenger Agent and Auditor of the company, with office at Swan River, Minn.

Grand Rapids & Indiana.—The stockholders of the company held their annual meeting in Grand Rapids, Mich., March 4. The following Directors were elected: W. R. Shelby, J. P. P. Hughart, W. O. Hughart, T. J. O'Brien, H. J. Hollister, J. M. Barnett, Grand Rapids; James McCrea, J. Barrows, Jos. Davidson, Jos. Wood, C. E. Speer, Benj. Thaw, Pittsburg, Pa.; J. N. Hutchinson, Philadelphia.

Gulf, Colorado & Santa Fe.—The annual election of directors and officers was held at Galveston, Tex., March 3. The directors elected are: Aldace F. Walker, E. P. Ripley, R. Somers Hayes, George Seal, John H. Hutchings, Leon Blum, B. F. Yoakum and J. W. Terry. Officers: E. P. Ripley, President; Daniel B. Robinson, George Seal and B. F. Yoakum, Vice-Presidents; John M. Bird, Secretary and Treasurer; L. C. Deming, Assistant Secretary; Harrison W. Gardner, Assistant Treasurer; John P. Whitehead, Comptroller, New York.

Lake Shore & Michigan Southern.—A change has been made in the titles of three officials. G. J. Grammar, General Freight Agent, has been made General Traffic Manager of Freight and Passenger Departments; W. H. Caniff's title has been changed from General Superintendent to General Manager, and Assistant General Superintendent Blodgett succeeds Mr. Caniff as General Superintendent.

Lehigh Valley.—The title of Mr. J. W. Lattig, Superintendent of Telegraph and Electrical Appliances, has been changed to Superintendent of Telegraph and Signals. He will have charge of all telegraph, telephone, signal and electrical appliances.

Pecos River.—Charles E. Pollock has been appointed Superintendent and Auditor, with headquarters at Pecos, Tex. This road is the Texas Division of the Pecos Valley, the Texas state laws requiring the organization of a separate corporation for a road operated within the state limits.

Philadelphia, Reading & New England.—J. R. Doran has been appointed Car Accountant of this Company, with office at Hartford, Conn., vice J. S. Snyder, transferred.

Seneca County.—The officers of this company are John F. Dolan, President, Elizabeth, N. J.; J. H. Gould, Seneca Falls, N. Y.; Paul B. Kendig, Waterloo, N. Y.; and J. H. Montgomery, Rochester, N. Y., Vice-Presidents; Hon. C. A. Hawley, Secretary, Seneca Falls, N. Y., and S. G. Gano, Chief Engineer, Geneva, N. Y.

Southern.—The following changes in the passenger department are announced: P. S. Gilmore, Northwestern Passenger Agent, at Chicago, resigned; J. C. Beam, Western Passenger Agent, Little Rock, Ark., transferred to Chicago; J. M. Means, Southwestern Passenger Agent, with headquarters at Houston, Tex., resigned. The territory of Major Andrews, of New Orleans, extended over the territory formerly covered by Mr. Beam and Mr. Means. The territory of Mr. Hunter Doll, at Chattanooga, is extended to cover the State of Ohio, while that of Mr. J. L. Meek, at Knoxville, is extended to cover the fourth division from Chattanooga to Ashville.

Terminal Railroad Association of St. Louis.—At the annual meeting last week President William Taussig resigned to take effect immediately. Mr. Julius S. Walsh of St. Louis was elected President and E. P. Bryan, the present General Manager, was elected Vice-President.

West Jersey & Atlantic.—The following directors were elected at the annual meeting last week: George Wood, W. J. Sewell, Aaron Fries, Mahlon Hutchinson, Benjamin F. Lee, John M. Moore, William S. Scull, Walter Wood, Israel G. Adam, John J. Gardner, N. Parker Shortridge, Samuel Rea, William L. Elkins. William L. Elkins was elected to fill the place of Samuel C. Lewis, deceased.

Wisconsin & Chippewa.—W. N. Merritt has been appointed Roadmaster of this road and of the Marinette, Tomahawk & Western, with office at Tomahawk, Wis.

RAILROAD CONSTRUCTION, INCORPORATIONS, SURVEYS, ETC.

Atchison, Topeka & Santa Fe.—President Ripley and other officers of the company, recently visited East Atchison, where the company's track, for a distance of nearly two miles, was carried away a year ago by the encroachments of the Missouri River. It was stated that as a result of the visit, the company would immediately replace the track, constructing trestlework where necessary. The company now uses the Burlington tracks on the west side of the river, between Atchison & St. Joseph at an annual rental.

California & Eastern.—Articles of incorporation of the company incorporated under the laws of Colorado, have been filed in California. The company was organized in Colorado some months ago. The object of the corporation was to purchase the Nevada Southern road and continue it through to Goode Springs, Nev., making a total length of 75 miles. The incorporators of the company are Roger W. Woodbury, William N. Byers, Earl B. Coe, Earl M. Cranston and Robert J. Pitkin, all of Denver.

Coal River.—A charter was issued last week in West Virginia to the "Coal River Railroad Company, of West Virginia." The incorporators are Robert T. Oney, Roman Pickens, Thomas L. Broun, and Stephen T. Teays and others. The charter permits the building of a road from St. Albans, W. Va., to the forks of Coal River and thence to a junction with the Norfolk & Western in Mercer County, with a branch road to Boone Court House. The chief office will be at Charleston, W. Va. The Coal River valley contains about 600,000 acres of the finest coal and timberland largely owned by the incorporators in West Virginia. It is expected that work can be commenced by July. The route has been surveyed.

Dennison & Northern.—The United States Judge for the Indian Territory has issued orders authorizing Receiver Scott to issue certificates to the amount of \$11,000 a mile of road, to be used in paying off indebtedness and the construction of the road, and authorizing the Receiver to contract with the Mineral Belt Construction Company for building the road. The road at present extends about 25 miles north of Denison, Tex., and is to be extended to coal mines in the Indian Territory.

Detroit & Mackinac.—The proposed extension to Bay City, Mich., has been definitely determined upon,

and the construction of the line will be undertaken as soon as the right of way is secured. As explained in these columns three weeks ago, Mr. Hawks, Vice-President of the company, agreed to build the line, provided right of way and terminals for the line in Bay City were given free of cost to the company. His propositions met with slight opposition at first, but were finally accepted by the citizens of Bay City. This extension will be about 35 miles long, and will be an extension of the line constructed last year to Omer. That extension leaves the main line of the company near Emery Junction, and extends directly south about 25 miles to its present terminus in Saginaw County. The branch was opened for freight traffic on Jan. 15 last. Passengers are taken on the freight trains.

Duluth, Mississippi River & Northern.—General Manager, J. F. Killorin announces the completion of the railroad into Hibbing, Minn. The road in connection with the Duluth & Winnipeg makes a direct route between Hibbing in the Mesabi iron range and points South, East and West.

Dunkirk, Allegheny Valley & Pittsburgh.—Smith, McIntire & Co., have taken the contract to build the line connecting this road at Falconer, N. Y., with the Jamestown & Lake Erie road at Jamestown. It is expected that 200 men will be placed at work at once in order that the road may be completed by Aug. 15. The new road is a "loop" connection, and will enable the Dunkirk, Allegheny Valley & Pittsburgh to run trains into Jamestown and to the Chautauqua assembly grounds.

Fort Collins, North Park & Western.—Incorporated in Colorado by Abner Lewis, F. C. Avery, C. R. Welch, J. A. Brown, C. F. Keyes and J. C. Hanna, with office at Fort Collins, Col. The company proposes to construct a road from Fort Collins up the Cache la Poudre Valley into and through North Park and thence to some available point in Western Colorado. There seems to be no foundation for the newspaper talk that this local company is supported by the Burlington which seeks to extend its lines in Colorado. The opening of the rich gold fields of Hahn's Peak this season promises to bring the northwestern portion of the state into prominence, and a railroad must in time be constructed thither.

Fulton Chain.—The New York State Railroad Company has granted the application of this railroad for authority to build a road from Fulton Chain Station on the Mohawk & Malone road to the Old Forge House, at the beginning of the Fulton chain of lakes in the Adirondacks. The distance is a little over two miles.

Georgia & Alabama.—An agreement has been entered into by President H. M. Comer, representing the Central Railroad of Georgia, and President J. S. Williams of the above railroad, which secures for the latter, under perpetual lease, the Lyons Branch of the Central of Georgia, extending from the Meldrim, on its main line, 17 miles from Savannah, to Lyons, a distance of 58 miles, the junction with the Georgia & Alabama. President Williams has also concluded a trackage agreement with the Central of Georgia for the use, by the Georgia & Alabama, of the 17 miles from Meldrim to Savannah, including the use of the extensive terminals of the Central in Savannah, on a basis similar to that enjoyed by the Florida Central & Peninsula road.

J. L. Rumbarger Lumber Company.—This company of Dobbin, W. Va., on the line of the West Virginia Central & Pittsburgh road, has bought from H. G. Davis a tract of 18,000 acres of timberland, lying ten miles from Dobbin, for \$300,000 to which a standard gage road will be built at once.

Kansas City, Fort Scott & Memphis.—The bill authorizing the company to extend its line from Baxter Springs to Miami, in the Indian Territory, has passed Congress. A branch of the road extends from Fort Scott to Baxter Springs and thence south to the north line of the Indian Territory. This bill authorizes the company to extend its road about 12 miles to the town of Miami, on the Neosho River. From the state line to Miami the proposed extension is an air line, running through a prairie country.

Kansas City, Pittsburgh & Gulf.—Monroe & Lee, railroad contractors, have about completed their contract on this road through the Choctaw Nation, and have signed another contract for 20 miles more south from the Choctaw Nation line in Arkansas. This places under contract all the work between Kansas City and Shreveport, La., leaving a gap of about 70 miles on which work has not been started, but which will be pushed as fast as men and teams can do the work. The post-office address of Monroe & Lee will be Nail, Indian Territory.

Lehigh & New England.—J. C. Miller & Co., of Bangor, Pa., who have the contract for building the connecting link in this company's line in Pennsylvania, have about two miles of the road graded so far, and at present 150 men are employed. This line is 8½ miles in length, extending from Bender's Junction to Pen Argyl, Pa. The company at present using the tracks of the Lehigh & Lackawanna between these points. The work is light, with maximum grades of 60 ft. to the mile, and a maximum curvature of 6 deg., and is being done under the direction of W. J. Young, of Pen Argyl, Superintendent of the company.

Lehigh Valley.—The two miles of new track between Hazleton and Stockton, Pa., around the present line of the company between those points, is now in operation. The construction of this new line was commenced early in January. It was made necessary by the cave-in of the old track where the roadbed had been built over a coal mine. Similar difficulties have been experienced a number of times by the railroads in the coal mining districts of Pennsylvania. The cave-in of the track near Stockton caused a wreck in which an engineer was killed.

Metropolitan Elevated (Chicago).—The line of the southwestern branch has been shortened about a mile. The original contract called for the construction of a road to the junction of Central Park and Ogden avenues. It is now proposed to make the western terminus at Rockwell street. Property owners between that point and the original terminus with whom negotiations for right of way were entered into have been notified that the extension beyond Rockwell street will not be built.

Montgomery & Tallasee.—This new road, in northern Alabama, built by the Tallasee Falls Manufacturing Co., to connect its cotton mills with the Western of Alabama, was finished a few weeks ago and is now ready for operation. It will probably be operated by the Western Railway of Alabama. It extends from Goodyn Station, Ala., on the latter road, to Tallasee, a town near Montgomery, and is about eight miles long. The Tallasee Falls Manufacturing Co. owns the large cotton mills at the latter town and controls all the stock of the railroad company.

New Roads.—The Briggs Lumber Company, of Lumberton, N. M., will at once extend its railroad from that town toward Pagosa Springs, Col., for five miles. The Chief Engineer is W. R. Dietrick. Six miles of this road, from Lumberton to Edith, were built last fall, and the present extension will bring the track to Chromo, Col., at the junction of the two Navajo creeks. Gold has been found recently at Elmwood camp, near Pagosa Springs. At present the road is used almost exclusively as a log road to the Briggs mills, but when the extension is built it will be opened for general traffic.

New York & Georgia.—A road is being built by the New York & Georgia Lumber and Railroad Co., from Tallapoosa, Ga., southwest toward the Chattahoochee River, with the idea of ultimately reaching Roanoke, Ala., 55 miles from Tallapoosa. At present, however, only five miles of road will be built to reach pine lands owned by the company. Two miles of this has been completed. There is a good deal of timber bridging on the road, and two bridges 250 ft. and 190 ft. long respectively have been built, and another 288 ft. long will be erected shortly. The company has a contract to deliver at Tallapoosa 25,000 ft. of logs daily for six months and 50,000 ft. daily for the next six months. Jesse Barlow is President and W. H. Greene Secretary of the company building the road.

Seneca County.—About 300 men are now working on this road, which is to be built across the northern part of Seneca County to connect the town of Seneca Falls with the Lehigh Valley road at Geneva, N. Y. The length of the line will be 10 miles, as stated a few weeks ago. About one mile of the road is now completed. J. F. Dolan, of Elizabeth, N. J., has the contract for the construction work, and he is also President of the company. The work is quite light, with maximum grades of one-half of one per cent., and a maximum curvature of 8% deg. It is expected to have the line in operation by July 1 next. The work is being very substantially done, and the road will be equipped with first-class rolling stock. S. G. Gano, of Geneva, N. Y., is Chief Engineer. The other officers are given in another column.

South Jersey.—The new company which is to be organized to construct the new line from this company's road near Petersburgh to Ocean City is being organized by Messrs. Fowler & Loomis, of 36 Walnut street, Philadelphia. The new line will extend directly west from the South Jersey track to the Atlantic coast at Ocean City, and will be about 10 miles long. When completed it will be operated as a branch of the South Jersey road, which is now being operated by a receiver.

Suffolk & Carolina.—This road, which at present extends from Suffolk, Va., to Montrose, N. C., a distance of 39 miles, about equally divided between the two states, is to be extended to Edenton, N. C., an important seaport town about 15 miles south of Montrose. The surveys have not yet been made, as the decision to extend the route has just been reached. The new line will give the road connection both by water and rail with other lines—by rail with the Norfolk & Carolina, via which route Tarboro, N. C., and several other important North Carolina towns will be put in direct connection with Suffolk. The traffic in hauling lumber and garden truck in that section is heavy and profitable. The Suffolk & Carolina has a capital stock of \$500,000, of which \$400,000 is outstanding.

Virginia, Fredericksburg & Western.—New directors, representing interests in the property held in Virginia, New England and New York City, have been recently elected, and Senator Gibson, of Maryland, has been elected President of the company. A new survey has been made which changes the original route somewhat. The line will run from Millenbeck, Va., on the lower Rappahannock River, to Davis, in Tucker County, W. Va. The general counsel of the road, State Senator Little, of Fredericksburg, states that the prospects for construction this year are bright.

Electric Railroad Construction.

Amherst, Mass.—The stockholders of the Amherst & Sunderland electric railroad have received a charter from the legislature and have chosen a board of directors, to whom the location and construction of the road is left. Levi Stockbridge is President and M. A. Coolidge, of Fitchburg, Mass., is the contractor.

Baltimore, Md.—The Baltimore & Gunpowder Railroad Co. has filed a bill for the right to build an electric railroad on the Philadelphia road in Baltimore County.

Catskill, N. Y.—The village of Catskill has granted a franchise to the Catskill, Cairo & Windham Street Railroad Co. for an electric road in Catskill. Daniel W. Sharpe is secretary.

Chardon, O.—The Lake & Geauga Transit Co., of Chardon, has filed articles of incorporation to build an electric road from Mentor to Cleveland. The capital stock is \$10,000, and some of the incorporators are S. S. Smith, H. H. Hollenbeck, and C. W. Orlone.

Cripple Creek, Col.—The Electric Tramway & Tunnel Co. has been incorporated. C. M. Rice is President, and the capital stock is \$2,000,000.

Dearborn, Mich.—Albert Pack, Henry A. Everett, John B. Corliss and George E. Clegg have petitioned for a franchise through the township of Dearborn for an electric road.

Denver, Colo.—Incorporation papers have been filed for a company which proposes to buy the street roads of Denver and consolidate them under one management. The capital of the company is \$3,700,000, and some of the incorporators are G. H. Holt and Charles Sheehan, of New York City; Joshua Wilbour, of Providence; Arthur Knight, East Greenwich, R. I., and George E. Randolph, receiver of the cable line of Denver.*

Detroit, Mich.—The Detroit Railway Co. has been granted a franchise for an electric railroad between Detroit and Wayne. Work will be begun at once, and the road is to be finished in a year.

Elyria, O.—The County Commissioners have granted a franchise to A. L. Garford, W. G. Sharp and others, of Elyria, for an electric railroad from Oberlin to Wellington. This will connect with the road from Elyria and Lorain at Oberlin.

Holyoke, Mass.—A bill has been introduced in the State Senate for the incorporation of a railroad to be built up Mt. Tom. Several of the incorporators are also directors of the Holyoke street railroad. The road, as proposed, will be about 4,800 ft. long, and rises in that distance 680 ft.

Gainesville, Fla.—A franchise has been granted to Graham, Cole and Taylor for an electric railroad and lighting plant.

Green Bay, Wis.—The Fox River Electric Co. will extend a street railroad five miles to De Pere. Work will be commenced as soon as frost is out of the ground, and will be finished July 1. The cost will be about \$35,000.

Hagerstown, Md.—Ex-Judge W. F. Sadler, of Carlisle, Pa., has applied for a franchise to build an electric railroad in Hagerstown. He agrees to begin work on the road 10 days after the franchise is granted.

Landsdowne, Pa.—The Darby, Landsdowne & Philadelphia Electric Railway Co. has been incorporated by W. P. Simpson, W. L. Verlenden, G. G. Howell and others. The road will be six miles long, extending from Collingsdale, through Darby, Yeadon and Landsdowne, suburbs of Philadelphia, to Cobb's Creek. The capital stock is \$36,000, and William McBryin is President.

New Brunswick, N. J.—The Raritan township committee has granted an ordinance to the Brunswick Traction Co. to extend its line across the Raritan River through Highland Park. The company has been trying to get the franchise for nine months.

New London, Conn.—The New London Street Railroad will erect a \$60,000 power house.

Norristown, Pa.—Permission has been granted the Schuylkill Valley Traction Co. to extend its line to Collegeville.

Oakland, Cal.—Articles of incorporation have been filed for the Oakland & Livermore Valley road by E. P. Vandercook, George D. Metcalf, A. D. Wilson and others. The capital stock is \$3,000,000, of which \$45,000 has been subscribed. The incorporators will build a road from Oakland to Livermore and thence southerly to the boundary line between the counties of Alameda and San Joaquin, with branches to adjacent towns. The total length of the road as estimated is 45 miles.

Oshkosh, Wis.—The Central Wisconsin Electric Railway Co. has let the contract to S. H. Bracey for grading, track-laying and furnishing steel ties for 41 miles of electric railroad to be built from Oshkosh to Neenah and Appleton. The estimated cost is \$700,000. G. H. Ketcham is President and F. M. Ohl Secretary of the company.

Oswego, N. Y.—The Lake Ontario & Riverside Railway Co. was incorporated this week. This company is formed by the consolidation of the Oswego Street Railway Co. and the Fulton & Oswego Falls Railway Co. The capital of the new company is \$300,000, and some of the directors are G. N. Burt, G. D. Hart, James B. Henderson, of Oswego, and N. N. Stranahan, G. H. Dexter and R. Bradshaw, of Fulton.

Philadelphia.—The Union Traction Co. is building an extension on Orthodox street, from Richmond street to Frankford avenue, a distance of one mile.

Phoenixville, Pa.—The engineers will soon complete the survey for the extension of the electric road from Trooper to Perkiomen Bridge.

Pine Bluff, Ark.—It is said the bondholders of the Citizens' Street Railway will change it into an electric railroad. J. M. Taylor is interested in the road, which is 11 miles long.

Sidney, O.—A company has been formed to build an electric road from Sidney to St. Mary's, extending through Wren, Newport, Lorette, Minster and New Bremen.

Spencer, Mass.—The Warren, Brookfield & Spencer Electric Railroad has been granted a charter for an electric road, and the Worcester Construction Co. has been awarded the contract for building it.

Tarrytown, N. Y.—The board of village trustees has granted a franchise to the New York, Elmsford & White Plains Trolley Railroad Co. for an electric road. There were four applications for the franchise. The road is to be along the Sawmill river road through Greenburgh and Mt. Pleasant and thence to the Elmsford station on the New York & Putnam Railroad, and from there to White Plains. The road will extend from there to Mamaroneck. The distance from Tarrytown to White Plains is about five miles and from White Plains to Mamaroneck 10 miles. A fare of five cents will be charged from White Plains to either of the other towns. The company has yet to obtain franchises from the towns of Greenburgh and Mt. Pleasant.

Yonkers, N. Y.—The Yonkers Railroad Co. has filed a certificate of extension of route from Yonkers to Hastings, in Dobbs Ferry, to Irvington and to Tarrytown, and also through additional streets in Yonkers.

GENERAL RAILROAD NEWS.

Abbeville & Waycross.—General Manager Gabbett, of the Georgia & Alabama road, announces that the operation of this road between Abbeville and Fitzgerald, Ga., will hereafter be conducted by the officers of the Georgia & Alabama road. The Abbeville & Waycross is 23 miles long, from Abbeville, on the Georgia & Alabama, south to Fitzgerald, Ga. The ownership of the road is not changed, the arrangement being simply a traffic contract.

Atchison, Topeka & Santa Fe.—The earnings for January as reported by the new form of statement were published last week. The returns for seven months are given below:

	1896.	1895.	Inc. or Dec.
Gross earn.	\$17,859,750	\$17,315,147	I. \$544,603
Oper. exp.	13,584,875	12,919,375	I. 665,507
Net earn.	\$4,274,875	\$1,395,772	D. \$120,897
Aver. oper. mileage...	6,481	6,481	

Baltimore & Ohio.—Gen. Louis Fitzgerald, Howard Davis, Eugene Delano, William A. Read and Edwin R. Bacon, the New York Directors of the railroad, who were designated as a reorganization committee, have added to their number August Belmont and Henry Budge, of New York. The committee has formally organized, with General Fitzgerald as chairman, and will formulate a plan for the readjustment of the company's finances.

Baltimore & Ohio Southwestern.—The relationship of the Baltimore & Ohio to this company—it owns a controlling interest in the stock—has caused some apprehension as to the company's finances. The officers point out that the company is not in any manner affected by the receivership. They state that the company is absolutely solvent; that it has a surplus of cash over and above every liability, and a large amount of assets and securities in its treasury; that its earnings for the first six months of the fiscal year are more than \$200,000 in excess of its fixed charges, taxes and expenses, and that its gross earnings up to the present time are \$50,000 in excess of last year.

Cape Fear & Yadkin Valley.—The case of some of the bondholders of this road against Receiver John Gill, of Baltimore, for the sale of the road in divisions, will come up before Judge Simonton, of the United States Circuit Court, at Asheville, N. C., March 19. There is a contest between the reorganization committees at New York and Baltimore. The latter committee propose a reorganization and sale of the property as a whole. The New York committee proposes a sale of the road in three sections, represented by three series of bonds, as heretofore explained in these columns. The stockholders in North Carolina are represented as favoring the Baltimore plan of reorganization.

Central of Georgia.—The statement of earnings and expenses for January, as compared with the same month of 1895, is as follows:

	1896.	1895.	Inc. or Dec.
Gross earn.	\$51,850	\$42,901	I. \$87,948
Oper. exp.	274,108	278,043	D. 3,935
Net earn.	\$237,742	\$145,858	I. \$91,884

Chicago, Burlington & Quincy.—The earnings for February are given below:

	1896.	1895.	Inc. or Dec.
Freight.	\$1,682,724	\$1,464,418	I. \$217,666
Passenger.	566,740	561,521	I. 5,219
Mail, etc.	34,140	348,451	D. 4,311
Total earn.	\$2,253,604	\$2,374,830	I. \$218,774
Oper. exp.	1,800,280	1,662,365	I. 137,915
Net earn.	\$793,324	\$712,465	I. \$80,859
Fixed charges	880,000	872,954	I. 7,046
Deficit.	\$86,676	\$160,489	D. \$73,813

The company has changed its monthly report of earnings by including Chicago, Burlington & Northern operations. Including these for both years there was an increase in gross earnings of \$218,773, the net gain being \$80,859. Fixed charges for the month were \$86,676 in excess of net earnings, which compares with a deficit of \$160,489 in 1895. January is a poor month for this road. In 1895 the exhibit, not including C. B. & N., showed gross earnings \$982,454 less than 1894, while net earnings increased \$113,313 by reduced expenses. The deficit, after charges of \$105,263, compares with a surplus of \$9,176 in 1894, and \$24,072 in 1893.

Chicago, Milwaukee & St. Paul.—The earnings and expenses for the month of January show an increase in the net earnings of \$148,253 over January of last year. The figures are as follows:

	Month of January:	1895.	1896.	Increase.
Gross earn.	\$1,894,373	\$2,329,622	\$435,244	
Total exp.	1,234,918	1,541,909	266,990	
Net earn.	\$639,460	\$787,713	\$148,253	
Seven months ending Jan. 31:				
Gross earn.	\$16,689,468	\$20,397,344	\$3,707,875	
Total exp.	10,715,946	11,717,036	991,089	
Net earn.	\$5,973,522	\$8,690,308	\$2,716,786	

Cincinnati, Lebanon & Northern.—The controlling interest in this property was last week transferred from the present directors to P. J. Goodheart & Co., who act as agents. The road consists of but 38 miles of line, the main line extending from Cincinnati to Dodds, O. 36 miles. The present traffic of the company is very light and is chiefly suburban travel to and from Cincinnati. The line, however, has an importance beyond the number of miles of road owned because of the entrance into Cincinnati which it possesses, and it also owns terminals there of some value. It is believed that the line has been purchased for President C. S. Brice, of the Lake Erie & Western, who also controls the Cincinnati, Jackson & Mackinaw. By building a short connection between the two roads the latter line could get an entrance to Cincinnati over the Cincinnati, Lebanon & Northern.

Erie.—The company reports earnings for January of the Erie and branches, the N. Y., P. & O. and the Chicago & Erie, as follows:

	1896.	1895.	Increase.
Gross earn.	\$2,316,112	\$2,094,120	\$221,992
Working exp.	1,821,955	1,742,499	79,496
Net earn.	\$494,117	\$351,621	\$142,496

Included in the expenses of 1896 is one-twelfth of the entire taxes of the year.

Fonda, Johnstown & Gloversville.—The New York Central & Hudson River Railroad has secured an additional interest in this road through a purchase of stock made by President Chauncey M. Depew, at a meeting of the company last week. The company operates 26 miles of steam road, connecting with the New York Central at Fonda, N. Y. The company also controls and operates an electric line, which parallels its road as far as Gloversville, about 10 miles.

Frederick & Pennsylvania.—This road, one of the branch lines of the Pennsylvania in Maryland, is to be sold at Frederick, Md., on June 9 next. The road has been operated under a lease by the Pennsylvania since 1875. The city of Frederick, Md., controls a large interest in the stock and is represented in the Board of Directors. The property will undoubtedly be purchased at the sale by the Pennsylvania, and there is some talk of the line being extended toward Washington, D. C. The company owns 28 miles of road from Frederick north to Kingsdale, on the state line between Maryland and Pennsylvania. At the northern terminus it connects with a branch of the Pennsylvania which extends to York. All the rolling stock used by the road is furnished by the Pennsylvania.

Grand Rapids & Indiana.—The United States Court at Grand Rapids, Mich., has rendered a decision in favor of the second mortgage bondholders to the amount of \$3,734,765 and ordered the sale of the entire property on April 27, 1896. The decree is made subject to the first mortgage bonds, amounting to \$6,157,645, and to a lien on equipment amounting to \$356,554. By its terms the holders of the third mortgage bonds, upon which there is outstanding \$3,996,000, are entirely cut off. The suit was brought April 27, 1895, by trustees for the second mortgage bondholders against the railroad and the trustees for the third mortgage bondholders. It sought to foreclose the second mortgage. The bonds are largely owned by the Pennsylvania Railroad.

The gross earnings of all roads operated last year, as shown by the annual report, were \$2,682,931, an increase of \$217,975. The expenses were \$2,146,863, an increase of \$210,365. Net earnings were \$536,068, an increase of \$7,609.

Green Bay, Winona & St. Paul.—The foreclosure sale of this Wisconsin road, which was to have taken place in Green Bay, Wis., on March 3, has been postponed

about 60 days, the court not deciding upon a definite date for the adjourned sale. The postponement of the sale was opposed by the Reorganization Committee, but was directed by the court on the application of the holder of about \$105,000 of the company's underlying bonds, who had not assented to the reorganization scheme and had been excluded from the reorganization plan by the committee. The lower court has decided the contention in the suit in favor of the Reorganization Committee, but the case has been appealed.

Hendersonville & Brevard.—The question of the appointment of a Receiver for this new North Carolina road, which was to have been heard at Asheville, N. C., on March 9, was postponed, at the request of Mr. W. A. Smith and M. W. Egerton and other officials. The postponement may enable the company to conclude negotiations now pending looking to a settlement of the road's finances. By consent the hearing will take place at Brevard, N. C., on April 1. The road, which was completed only last year, operates 21½ miles of track between Brevard and Hendersonville, N. C., where connection is made with the Western North Carolina road, a division of the Southern Railway, and was completed only last year. The company has a capital stock of \$250,000 and a funded debt of \$150,000. The road cost \$347,000.

Illinois Central.—The income from traffic for the seven months ending Jan. 31, 1896 and 1895 is reported as follows:

	1895.	1896.	Increase.
Miles operated.....	2,888	2,888	
Gross receipts from traffic.....	\$13,077,489	\$11,437,162	\$1,640,327
Oper. exp. and taxes.....	\$430,085	8,031,555	395,530
Net earn.....	\$4,647,404	\$3,405,637	\$1,241,797

The gross receipts for the month of February, 1896, are estimated at \$1,571,288; the receipts for February, 1895, were \$1,415,304; an estimated increase of \$155,984.

Kansas City & Omaha.—Judge Sanborn, of the United States Court at Omaha, has granted a decree of foreclosure and sale against the road. The upset price has been fixed at \$100,000, and the purchaser must pay all deficiencies in the operating expenses and unpaid taxes and other claims that may afterward be adjudged to be a lien against the road. The total amount of bonds for which the suit was brought is \$2,715,000. The road is a part of the St. Joseph & Grand Island road, and with it was operated as a part of the Union Pacific.

Kinderhook & Hudson.—This road, 18 miles in length on the east side of the Hudson River, in New York, was sold in Hudson, N. Y., March 7, to satisfy a judgment obtained by the Atlantic Trust Co., of New York. The only bidder was a representative of the committee of bondholders, who bid \$100,000. The road is mortgaged for \$375,000.

Little Lake, Hot Springs & Texas.—J. S. Lonsdale, of Hot Springs, Ark., has been appointed receiver of this road at Little Rock, Ark. The application for a receiver was made by Johnson & Hanson, railroad contractors of San Antonio, Tex., who have a claim against the company of about \$80,000. This is a project started several years ago by Uriah Lott, the builder of the San Antonio & Aransas Pass road in Texas and for many years President of that company. He proposed to build a line connecting Little Rock and Hot Springs, and in 1893 began work at Hot Springs. So far about 30 miles of road have been graded between Hot Springs and Benton. It is said that the construction work so far done has cost about \$300,000. To represent this the company owns the graded roadbed (on which track has been laid for four miles), about 125,000 crossties, 400 tons of rails, the right of way between Benton and Hot Springs and other less valuable property.

Louisville, Evansville & St. Louis.—Suit to foreclose the first, second and third mortgages, and for the appointment of other than the present receivers, was begun in the Federal Court at Indianapolis, on March 9. Edward Hopkins and James Wilson, the present Receivers, and others by the American Loan & Trust Co. There are \$9,624,350 bonds outstanding.

Memphis & Charleston.—The reorganization plan, announced last week, provides for the creation of a new company and the issue of \$6,500,000 first mortgage 100-year gold bonds, bearing 4 per cent. to 1901, 4½ per cent. thereafter to 1906, and 5 per cent. thenceforth. These bonds may be increased \$1,500,000 for any extension, and \$1,416,800 are in any case reserved for betterments. Interest on the bonds will be secured by the terms of a lease of the property to the Southern Railway, which is the largest stockholder. There will be issued \$5,000,000 of 5 per cent. non-cumulative income bonds, or 5 per cent. preferred stock, as may be determined hereafter. Control in common stock is to be delivered to the Southern Railway in consideration of rental and release of claim on account of floating debt. There will be an assessment on the present stock of \$4 per share. The length of main line and branches upon which the first mortgage will be a lien is 292, and the issue will be at the rate of \$17,408 a mile. The issue of income bonds or of preferred stock will be at the rate of \$17,113 a mile. The reorganization committee consists of Adrian Iselin, Jr., Frederic Cromwell, W. Emlen Roosevelt and Edward N. Gibbs. In submitting its plan the committee calls attention to the fact that the average net earnings of the company for the last ten years were \$368,408, and for the last five years only \$288,000. The decline in net earnings has been steady. The annual fixed charges are \$376,680. The company has a floating debt of \$139,564, due the East Tennessee, Virginia & Georgia, and is in arrears \$39,202 in the interest on its 7 per cent. bonds, and \$265,200 on its 6 per cent. bonds, a total of \$1,104,402. Moreover extensive repairs and betterments are necessary, including air-brakes and automatic couplers required by law. Provisions for these expenses, for the liquidation of the floating debt and for readjustment of the funded debt are, therefore, imperative. Maximum fixed charges of \$325,000 are contemplated after the property has been put in first class condition.

Montreal, Portland & Boston.—This road, operating about 40 miles of line from St. Lambert, Que., on the south side of the St. Lawrence River, opposite Montreal, to a connection with the Central Vermont, was sold by the sheriff at Montreal on March 2 for \$1,625, to J. N. Greenhields, Q. C., acting for the bondholders. The road is at present operated by the Central Vermont under an arrangement made in 1883. Previous to that it had been operated by the Southeastern Railroad, a subsidiary corporation of the Canadian Pacific.

New England.—The New England Railroad Company has notified the officers of the Milford, Franklin & Providence and Woonsocket & Pascoag companies, in Rhode Island, that on March 31 the company will surrender the two latter lines. The first-named road is an extension of the Milford & Woonsocket, which has also been notified by

the New England that its road will be returned to the stockholders.

West Jersey.—The annual report for the year ending Dec. 31 shows gross earnings of \$1,611,771; gross earnings for 1894, \$1,552,751; increase in gross earnings, \$59,020; expenses, 1895, \$1,232,957; expenses the previous year, \$1,173,263; increase in expenses, \$59,694; net earnings, \$378,814; decrease in net earnings, \$673. The number of passengers carried during the year was 2,498,887, showing an increase over the previous year of 111,253. There were 808,883 tons of freight moved. The earnings from freight traffic were \$550,896, and from passenger traffic \$894,166. The expenses for maintenance of way and structures were \$292,228, and for conducting transportation, \$683,231.

North Pennsylvania.—An extension of a \$1,500,000 mortgage of the company to Edward C. Knight, Jr., and Herbert M. Howe, of Philadelphia, Trustees, was filed in Pennsylvania last week. The mortgage was executed May 18, 1866, matures May 18 next, and bears seven per cent. interest. By the extension the bonds are payable in 1936, and rate of interest is reduced to four per cent.

Northern Pacific.—Judges Gilbert and Hanford, of the United States Court, after the hearing before them at Seattle, Wash., on March 4, refused to grant the application of the Farmers' Loan & Trust Co., of New York, for the removal of Andrew E. Burleigh, their one appointee, as Receiver of the road. They likewise declined to appoint Messrs. Bigelow and McHenry. The motion of the Northern Pacific Company that there be four receivers, Messrs. Burleigh, Bigelow, Galloway and McHenry, was also denied.

Oregon Short Line & Utah Northern.—The reorganization committee announces that it has prepared a plan for the rehabilitation of the company, and that the plan has secured the approval of all committees representing securities affected by it.

Pittsburgh, Marion & Chicago.—W. S. Gurnee & Co., a New York banking firm, obtained a judgment for about \$10,000 against this company in the state court at Lisbon, O., last week, and an order for the sale of the road was issued. The road is a small one, operating 25 miles of line between New Lisbon and New Galilee, Pa. W. S. Gurnee, of the firm securing the judgment, is one of the directors, and a majority of the directors are New York people.

Electric Railroad News.

Baltimore, Md.—A bill has been introduced in the legislature to consolidate the four companies that are building electric roads between Baltimore and Washington. These companies are the Columbia & Maryland, the Edmondson Avenue, Catonsville & Ellicott City, the Maryland & Washington, and the Baltimore & Washington Turnpike Tramway. The name of the consolidated corporation will be the Columbia & Maryland Railway Co., and the bill grants the consolidated body all the privileges and immunities conferred by the charters of the separate companies.

Cape May, N. J.—The Cape May, Delaware Bay & Sewell's electric road has been leased by Mayor Edmunds for five years, dating February 1, 1896. Its roadbed and plant will be put in complete order at once for the summer traffic.

Denver, Col.—The Denver City Cable Co. will be reorganized by the bondholders as the Denver City Railway Co. The cable company was organized in 1888 and five years after went into the hands of a receiver. Last November the property was bid in by the bondholders for the nominal sum of \$500,000. The present receiver will continue in charge till the May term of court, when the property will be turned over to the new organization. It is proposed to change the cable road to an electric one and to build extensions.

Kansas City, Mo.—Eastern creditors of the Waldo Park Motor Railway Co. have asked that a receiver be appointed for the property. The road has not been in operation for some time and the liabilities amount to about \$75,000.

Nashville, Tenn.—The property of the Nashville Traction Co. has been sold at auction to the bondholders for \$100,000. The sale was under decree of the Court upon petition of the Baltimore Trust & Guaranty Co. A number of creditors have filed a petition asking that the first mortgage bonds be declared void on technical grounds.

Syracuse, N. Y.—The Syracuse Street Railroad Co. has gone into receivers' hands. Edward B. Judson, Jr., and W. Judson Smith are the Receivers. The company's floating indebtedness and other obligations aggregate about \$1,000,000. A mortgage for \$2,500,000, held by the State Trust Company of New York City, will be foreclosed.

TRAFFIC.

Traffic Notes.

The Texas Railroad Commissioners have issued a tariff, to take effect March 23, reducing the rates on grain, flour and hay, the principal object being to facilitate the movement of corn from the interior to the seaboard.

The Missouri Pacific has modified or abolished the charges on cattle shipped to the Omaha stock yards, thereby meeting a long-standing complaint of the shippers.

San Francisco papers report that freight is now going from that city to Arizona by way of Guaymas, Mexico. The goods are taken to Guaymas by vessels of the Pacific Coast Steamship Co., and thence northward over the Sonora Railroad, which is controlled by the Atchison, Topeka & Santa Fe.

The highest court in the state of Maine has decided, in the suit of a passenger against a conductor of the Maine Central, that the coupons torn from a mileage book may be taken either from the front or the back of the book. The important question whether the conductor should hold the book in his right hand or his left, while tearing out the leaves, seems not to have been brought up in this litigation.

The Kansas Railroad Commissioners have sent to the Interstate Commerce Commission a petition in behalf of the shippers of Kansas asking the commission to order a more equitable rate on corn to Galveston and New Orleans. It is claimed that great injustice is done by giving Kansas City, St. Joseph and Leavenworth lower rates on grain shipments to Gulf ports than are allowed at places in Kansas much nearer the Gulf.

The Southern Pacific has reduced the first-class fare from San Francisco to Portland from \$15 to \$10, and the second-class from \$7.50 to \$5. It is said that this is on account of the large proportion of business that has been going by the steamers of the Oregon Railway & Navigation Company. The rate war of two months ago was terminated by the advance of the railroad rates, but the present action seems to indicate that the settlement was not made on a sound basis.

As is well known, the Southern Pacific has for a long time been very active in securing passenger business for the Sunset Route, and in order to secure travel via New Orleans it is frequently obliged to make "concessions." Failing to secure an agreement under the emigrant clearing house plan, its competitors have in retaliation been playing freeze-out game for some time, but thus far the Southern Pacific has managed to stay in with the rest. Its latest move is the making up of a through "tourist route" from Boston to Los Angeles by furnishing first-class tickets and Pullman accommodations from Boston to Chicago or Cincinnati and second-class tickets and tourist sleeping car accommodations from there to Los Angeles, at the same rate charged by the other lines running through tourist cars from Boston, with second-class accommodations all the way. The Southern Pacific claims as a defense its inability to furnish tourist accommodations east of Chicago or Cincinnati. This method of "equalization" naturally does not commend itself to the other lines, and the matter was brought before the Trans-Continental Passenger Association. The chairman of that association rules against the Southern Pacific, holding, in substance, that if the company wishes to give passengers the benefit of second-class rates, it must get its connections to run second-class cars.

Joint Traffic Association Decisions.

The Board of Managers of the Joint Traffic Association have issued a decision to the effect that advance committees or agents of large parties, conventions, etc., should not receive free transportation. Another circular holds that clerical tickets, permits or orders issued east of Buffalo, Pittsburgh, etc., should not be valid west of those points, and tickets, etc., issued in the western territory should not be valid in the eastern. The managers approve the granting of reduced fares to employees of transportation companies, with which interchange relations exist, when the application comes from the proper officer of the applying company. A resolution has been passed by the Board to the effect that no company shall advertise in papers, programmes, circulars, etc., issued by societies, theatrical companies, etc., to which reduced fares are granted, such advertisements being often equivalent to unauthorized reductions of fares. The reduction in the rates on grain from Buffalo and Erie to New York, recently approved, applies only on lots of 8,000 bushels, shipped at one time. Reductions were also approved to Philadelphia and Baltimore. On oats the limit is 10,000 bushels instead of 8,000.

Chicago Traffic Matters.

CHICAGO, March 11, 1896.

There is still trouble between the Western and the Eastern roads over the Grand Trunk's 25-cent grain tariff. Chairman Midgley claims that he did not receive Mr. Hays' notice in time to cancel the tariff before March 11, and a controversy ensued between Traffic Manager Reeve and Mr. Midgley; and now the latter says the Western Freight Association will not join their Eastern connections in reduced rates on westbound business; if the Joint Traffic lines will not help the Western roads to meet outside competition the Eastern roads must not expect assistance on westbound. In a recent private letter to the officers of his association Mr. Midgley gives figures showing how the Soo (Canadian Pacific) has captured the bulk of the oat shipments from the Northwest. From Aug. 1, 1895, to Feb. 1, 1896, the receipts and shipments of oats in bushels at Minneapolis were as follows :

	Receipts.	Shipments.
C. M. & St. P.	1,421,570	54,740
C. St. P. M. & O.	1,272,60	64,430
C. G. W.	523,470	
Great Nor.	505,850	16,020
M. & St. L.	371,740	2,480
So Line	64,900	2,153,960

In the circuit court at Springfield, Ill., Judge Creighton has decided that the railroads delivering cars of cattle to the Union Stock Yards in Chicago have a legal right to make a switching charge of \$2 per car. The Illinois Railroad Commissioners had ruled the charge to be an extortion and sued the Chicago & Alton to collect a fine for ignoring the ruling. The Commission has appealed the case, and will proceed with similar suits against the Rock Island, Northwestern, Burlington and St. Paul lines, before another judge.

At a recent meeting of the General Baggage Agents, General Passenger Agents and representatives of the leading express companies in this city it was agreed that hereafter only such trunks, boxes, bags or satchels as can be safely piled in tiers, and transported in baggage cars shall be received as baggage. From this rule are excepted theatrical scenery and paraphernalia, bicycles, tricycles and baby carriages, which will be accepted under the old rules of the Western Passenger Association.

All kinds of reports are in circulation in this city regarding eastbound rates. A large amount of grain is being shipped from Chicago to Newport News; but as there is a differential to that port the increased shipments are no indication of cut rates. Another report is that the steamship lines from New York are absorbing a portion of the through export rates from Chicago. Last week's shipments to the East amounted to 87,563 tons, compared with 90,372 tons for the previous week, and 55,724 tons for the corresponding week of last year. The quantities carried by each road were :

	Week to Mar. 7.	Week to Feb. 29.
Tons.	Tons.	
Michigan Central	9,493	8,665
Wabash	6,699	6,340
Lake Shore & Mich. South	11,450	13,132
Pitts., Ft. Wayne & Chic. go.	8,128	9,216
Pitts. Cin., Chi. & St. Louis	7,789	7,724
Baltimore & Ohio	6,289	7,200
Chicago & Grand Trunk	12,171	11,050
New York, Chic. & St. Louis	6,153	6,246
Erie	15,711	14,350
C. C. C. & St. Louis	3,650	4,430
Totals	87,563	90,372

Of the above shipments, 3,539 tons were flour, 54,015 tons grain and mill stuffs, 9,412 tons provisions, 8,715 tons dressed beef, 1,557 tons butter, 1,483 tons hides, and 5,535 tons lumber. *